

## PREVENTION



## PREPAREDNESS



ASEAN GUIDELINES ON



# PEATLAND

# FIRE MANAGEMENT

## RESPONSE



## RECOVERY



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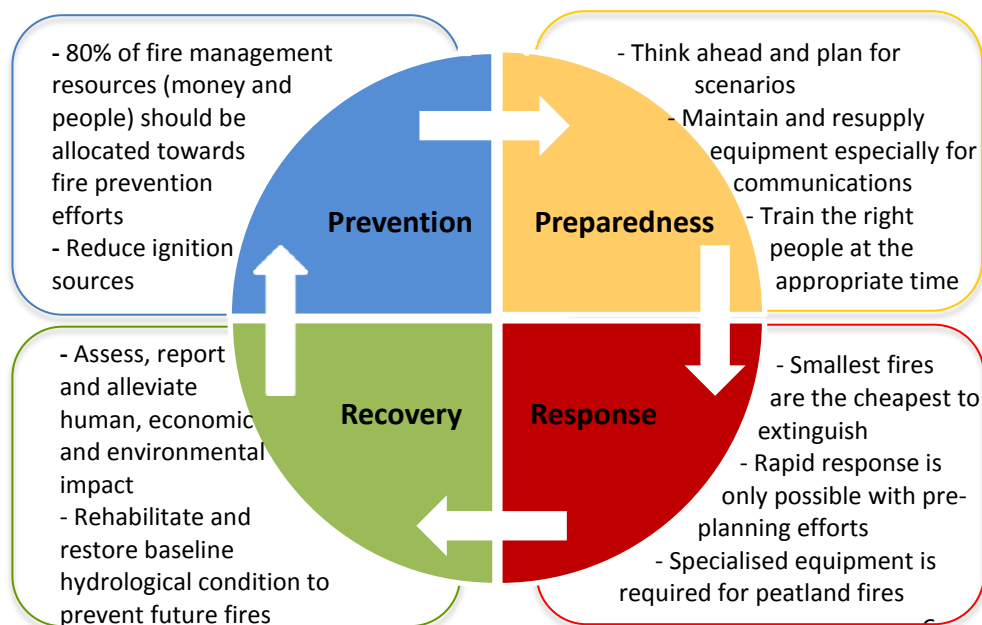
Environment Division  
ASEAN Secretariat

# Introduction

This set of guidelines and management practices on peatland fire management was developed at a joint workshop comprising ASEAN Member State representatives, with the objective of providing a set of strategies to mitigate fires in peatland ecosystems, and the ambition of eventually overcoming them.

## Integrated Fire Management

Integrated fire management (IFM) aims to holistically address the problems and issues posed by unwanted fires within the context of the natural environment and socio-economic systems. IFM combines the components of fire management, namely Prevention, Preparedness, Response and Recovery (PPRR), to provide a holistic and scale-able framework. IFM provides guidance for all stakeholders to implement actions at the appropriate time and scale to prepare for and manage any fire situation.



IFM increases in effectiveness when linked with Community Based Fire Management (CBFiM). Through this link, the IFM plan becomes more integrated across the community stakeholders. For example, CBFiM Plans form the foundation for Myanmar's fire management approach at the community level, and are linked *via* an IFM plan at the landscape level.

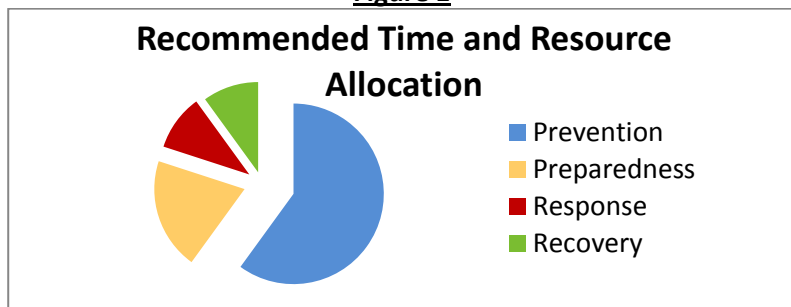
IFM helps stakeholders take note of key fire principles and strategies within each component of the PPRR process, i.e. implementing specific actions to achieve lower ignition rates; well-designed training; fast and effective response with higher success rates of early suppression; and comprehensive recovery. The key principles are included in the previous diagram and the possible strategies are mentioned in the later pages.

## Resource Allocation

Currently, insufficient resources (money and manpower) are allocated to fire prevention activities such as ignition reduction, hydrological management and regulation enforcement, as compared to suppression efforts. This unbalanced fire management focus results in larger uncontrollable fires due to a lack of prevention and preparation across the landscape.

Agencies and companies should try to focus 80% of their resources on prevention and preparedness activities (see Figure 1 below).

**Figure 1**



## Hydrological Management

Hydrological management is the most crucial aspect of ensuring the sustainability of peatland ecosystems and preventing fires. High water table levels reduce fire ignitions and the spread of uncontrollable peatland fires during prolonged dry weather conditions.



Images courtesy of Brett Shields

Peatlands in their undisturbed state rarely burn. They also fulfill important ecological functions such as the regulation of surface and groundwater. The draining of peatlands for agriculture development severely disturbs this finely balanced ecosystem by lowering ground water levels, bringing about a dry surface layer. This makes drained peatland ecosystems highly susceptible to fire incidents. The drying of the peat soil also promotes increased subsidence, which lowers the ground, making it more vulnerable to flooding during storm events, high tides and storm surges.



Flooded palm oil plantation due to peat soil subsidence. (Photo by Deltares)

Returning peatlands to a natural hydrological balance is important in fire prevention and peatland sustainability. Water table levels should be monitored and regulated throughout the year. Cascade canal blocking is one option that can be used to maintain constant water levels throughout the ecosystem.

Photo by: Global Environment Centre





# PREVENTION

## Policies and Regulations

Since 90% of the transboundary smoke haze in ASEAN is linked to peat fires - the introduction of national policies and regulations for protection and sustainable use of peatland resources is the first crucial national step towards peatland fire management. Monitoring and enforcing these plans and regulations is the second most crucial national step. The conduct of routine audits; company and agency fines for non-compliance; and holding the executives of companies and agency heads responsible for breaches of the regulations are all important steps toward increasing the effectiveness of policies and regulations for better peatland management. This effort can be facilitated with clearly defined land tenure and ownership.

**Jakarta Post**

### **Riau carries out compliance audit on fire prevention**



The ASEAN Member States that have peatlands are all developing or have already developed National Action Plans for Peatlands (NAPPs). These NAPPs need to have a balanced approach which recognises that the drainage of peatland for commercial agriculture is not a sustainable practice. Furthermore, due to the sensitivity of peatland

hydrology, draining a section of peatland will inadvertently and adversely impact the overall hydrological unit by causing the other areas of the peatland to dry out. Therefore, proper land use zoning should be conducted to minimize the use of peatland for development. Hydrological management regimes should be established to maintain appropriate water levels and reduce the vulnerability of peatland to subsidence and decline.

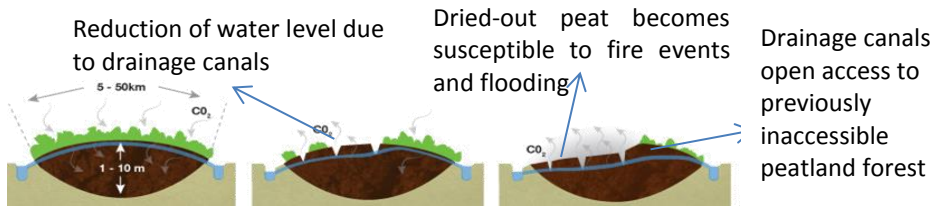


Photo from: <http://www.greenpeace.org/seasia/PageFiles/616278/peat-delft.jpg>

Lastly, the peatlands need to be recognised as an integral part of the lowland landscape and coastal protection system, which protect the inland forests and communities from storm surges and floods, and provide fresh water, timber and Non-Timber Forest Products (NTFP).

## Peatland Fire Prevention Measures

In peatland areas it is critical to take measure to prevent fires through enhanced land and water management and promotion of land management and development approaches that minimise fire risk. The most important approach in this regard is water management. If water levels within fire prone peatlands are maintained at a high level through the dry season – the risk of significant fires can be reduced. This can be done through blocking of any drainage ditches in peatland forest or abandoned agricultural land and improving the water management in any existing plantation and agricultural land through installation and operation of water control structures. Where possible water levels should be maintained in natural peatland forest areas at no more than 20cm below the surface and, in agriculture and plantation areas, no more than 40cm below the surface. In high fire risk areas options to enhance the water level through tapping artesian water through tube wells or pumping water from rivers or lakes can be considered.

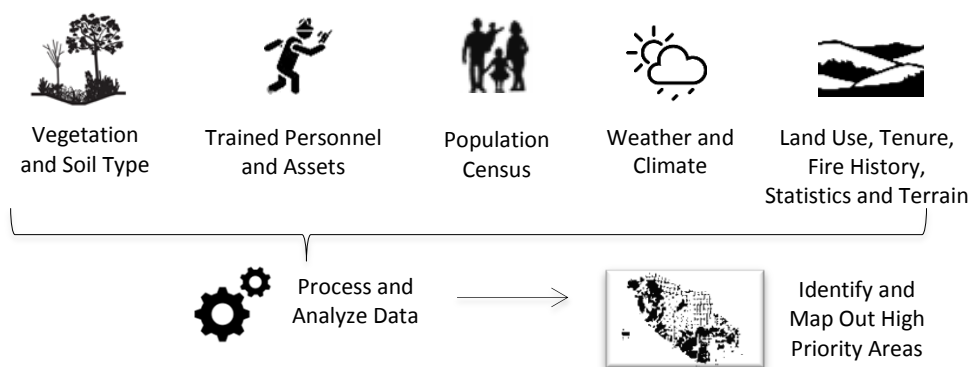
Peatland fires can also be prevented by encouraging the adoption of agroforestry systems rather than annual crops. Agroforestry can

generate enhanced income while reducing fire risk. Zero burning approaches to land preparation must also be practiced.

## Information and Knowledge

Informed decisions on planning and allocation of resources can only be made by understanding the landscape. Therefore, information on terrain, road access, vegetation, soils, fire history, infrastructure, demographics, socio-economic status and land ownership must be collected frequently for future analysis and use (see Figure 2 below).

**Figure 2**



After any fire event, a fire report should be created to capture the cause, behaviour and the impact of the fire. The data should be analysed to provide context for better management and oversight in the future.

Lastly, fire managers should use the knowledge, experience and data from the previous fire seasons to review, improve and refine the strategies and monitor their effectiveness for the next fire season.

## Planning and Coordination

A fire management plan helps all stakeholders understand the level of support that should be provided to plan for and manage various scenarios that can be considered ahead of time. During the fire season, the plan can be used to delegate roles and responsibilities amongst stakeholders to ensure a coordinated and efficient approach.



The plan can then be used to familiarize the stakeholders with each other and collate the necessary information. The plan ensures that all stakeholders are also familiar with its contents. This is to build a shared understanding of the issues and facilitate cooperation and open communication in times of crisis.

Creating a fire management plan is the first step towards the collective improvement of stakeholders' knowledge. As part of the plan's development, considerable effort is required to instill cooperation and coordination amongst all relevant stakeholders. This includes government agencies, communities, companies and NGOs. The stakeholders should be listed and consulted in a cooperative fashion so that the roles and duties of each stakeholder are clearly defined and agreed upon to build an effective and complementary approach towards each possible scenario.

This fundamental basis of cooperative fire management is ingrained in Integrated Fire Management (IFM) planning. An IFM Plan is required across all peatland



Example of stakeholder engagement.

landscapes, and should aim to gather the required landscape and community knowledge to better manage fire and engender co-operation amongst stakeholders.

An IFM Plan should also be partnered with a Community-based Fire Management (CBFiM) Plan. The IFM plan can cover the wider landscape such as protected areas, sub-district or district scale and incorporate the local community needs and variability via a nested CBFiM plan. This type of dual planning is currently under trial in Myanmar.

## Resources

Fire-fighting supplies, including equipment and consumables, need to be appropriate for terrain, constantly maintained and restocked once used. It is also important to ensure that sufficient supplies of Personal Protective Equipment are available to safeguard fire-fighter welfare and safety at all times.



Hand tools, pumps and hoses



Tractors with large tracks to distribute weight over soft soil



Personal Protective Equipment, food and water supplies

Proactive management of peatland hydrology to re-wet peat and restore degraded land back into forest



Images courtesy of (top left moving clockwise): Olle Wennstrom, [www.mytractorforum.com](http://www.mytractorforum.com), Olle Wennstrom, , WWF Indonesia GEC)

## Training

The development of training courses for peatland fire management is important and requires considerable attention to various details such as the materials; timing of training; and human resource management, i.e. who is being trained and for what purpose. If there is a limited volume of equipment, the number of effective trained personnel on the ground would also be limited. Therefore, recruitment of talent is crucial and training must be conducted with personnel capable of assistance in the suppression effort and agencies in charge must be willing to empower these volunteers during emergencies.

Ideally, training materials should be designed so that the same course materials can be used across the different stakeholders, i.e. the government, private companies and community. This would make training more efficient and effective as it can be replicated quickly. Furthermore, the similar materials would align the stakeholders to a common language and understanding.

Since fire prevention requires community effort, training must be extended to all stakeholders. This not only increases the overall fire-related knowledge and skills, but also empowers the community by giving all stakeholders a sense of shared responsibility to take initiatives toward fire prevention and suppression.



1

Within the peatland environment, several streams of training materials development and delivery are required:

1. Ensuring that all fire management crew are familiar with their roles and responsibilities (e.g. fire fighter, crew leader, incident commander).
2. Training in land management without fire, changing agricultural practices and improved water management in peatlands.

3. Alignment of the education courses to create linkages and cooperation amongst stakeholders, in order to build collaborative processes and shared ideals to work towards.

Realistically, not all members of the community are young and fit and can be trained to become voluntary fire-fighters. However, other members can play an active role by providing logistical support such as delivering water, food and supplies to a fire-fighting effort; building fire breaks; learning and applying sustainable agriculture practices; and developing and supporting alternative methods of clearing land. Community leaders can also educate others about fire behaviour; ignition and resource control; as well as planning and reporting tools which can be applied in times of emergencies.

## Public Communications

Communicating effectively with communities and the public and private sectors in remote and rural landscapes is important. With the increasing use of smartphones and mobile applications, the design and development of useful and supportive communications in traditional and social media is important. Tools such as one-stop information phone and web applications, to obtain information such as fire emergency telephone numbers or to send and receive fire alerts, could be developed and promoted so that all stakeholders can share important information with each other.



Images courtesy of: [aseanfirealert.org](http://aseanfirealert.org)



The communications team in the fire management organisation must be aware of the needs of the public and provide sufficient information without causing community alarm. In addition, they also need to filter and transfer the information to the relevant authorities to manage emergency circumstances.

Communicating the right message to target audiences is an important consideration in fire management. For example, if you are attempting to reduce the incidence of fire ignition from agriculture practices, the key target audience will be the local farmer groups and farmer cooperatives.

Great care must be taken when developing and delivering communications. An incorrect message can inadvertently cause an increase in fire, for example paying for the services of local fire-fighters may be perceived to be a good practice, but it could cause more intentional fires so the community could earn more money from fire-fighting. Perverse incentives like this need to be avoided.

## Education

Public understanding and support for fire prevention is important to create a strong social norm that balances the use of fire. The use of fires may sometimes be the only option open to smallholders for small-scale agriculture purposes where it may not be cost-effective to rent an excavator or tractor to mechanically clear and prepare the land. Therefore, affordable alternative mechanisms and techniques must be discussed, tested and made accessible. Governments may explore subsidised and collaborative activities and partnerships with larger companies to make such equipment available at a reasonable price to smallholders and encourage the adoption of mechanical clearing.

Research has shown that the burning of peat is an unsustainable practice as it results in increased peat loss and subsidence. Therefore, farmers need to be educated and trained on the best peatland agriculture methods to discourage harmful practices.



In order to create and increase public commitment to zero burning, the public must first understand that fires have a detrimental impact on themselves and their family's health. This would create a personal stake in this issue. Thus, it is important to propagate this effort *via* the use of educational materials to generate awareness about the impact of smoke haze pollution on human health.



If farmers and the public become educated and aware of the dangers caused by fires and have alternative land management methods, such knowledge can become an effective deterrent as the public becomes increasingly involved and active in spotting and reporting perpetrators who use fire illegally to the relevant authorities.

For any fire strategy to work, it is of utmost importance to develop and implement alternative land management strategies. Failure to do so would only force rural communities to violate the law in order to sustain their livelihood. This could instead create a social acceptance for the use of fires, further aggravating the problem.

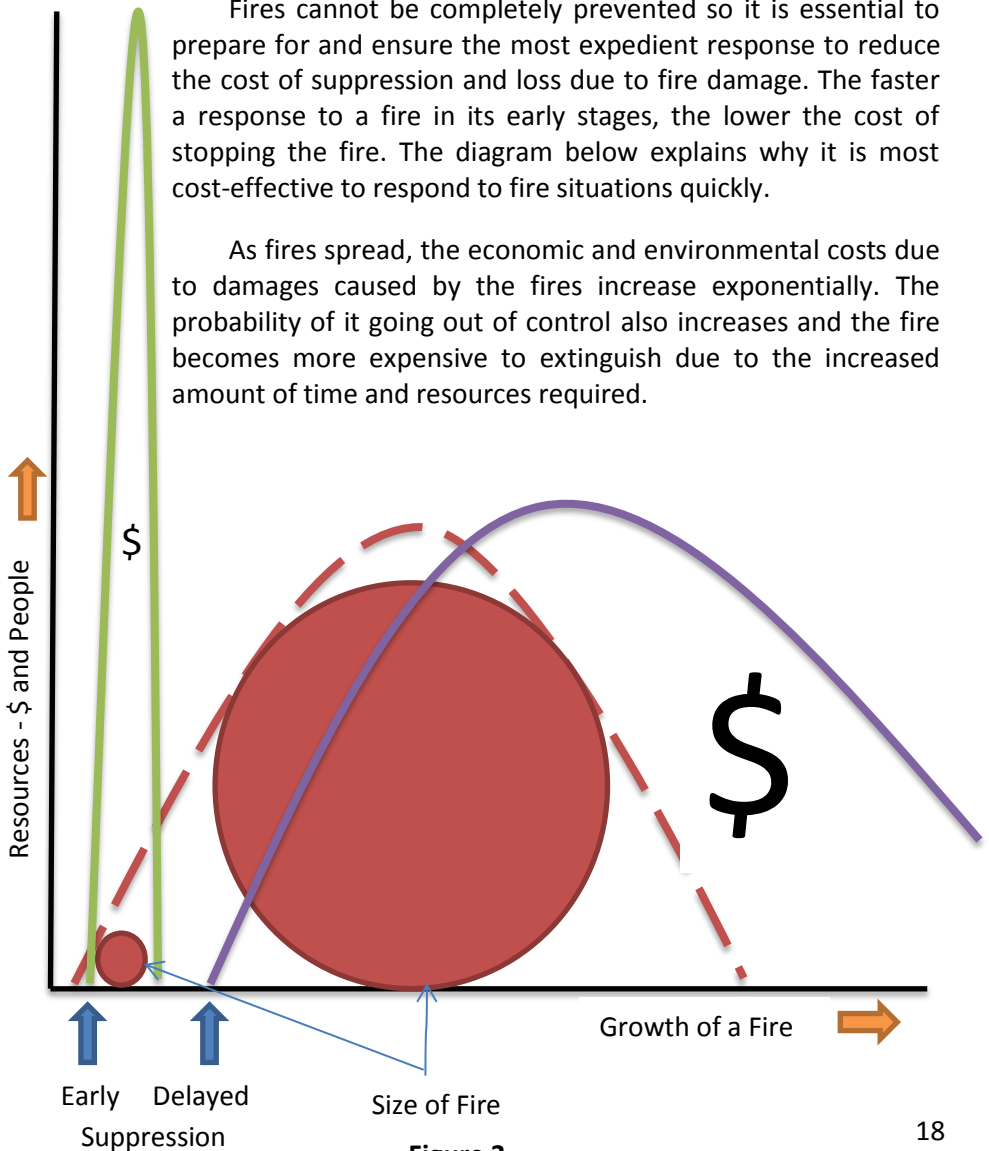
<sup>1</sup> Images courtesy of Department of National Parks, Forest Fire Control Division, Thailand

# PREPAREDNESS

## Policies and Regulations

Fires cannot be completely prevented so it is essential to prepare for and ensure the most expedient response to reduce the cost of suppression and loss due to fire damage. The faster a response to a fire in its early stages, the lower the cost of stopping the fire. The diagram below explains why it is most cost-effective to respond to fire situations quickly.

As fires spread, the economic and environmental costs due to damages caused by the fires increase exponentially. The probability of it going out of control also increases and the fire becomes more expensive to extinguish due to the increased amount of time and resources required.



**Figure 3**

Therefore, to avoid increased costs and losses from a delayed deployment of fire suppression resources, funds should be pre-allocated for rapid response to fires, with the intention that stakeholders have easy and quick access to resources when required. Similarly, the streamlining of approvals for access to these funds will assist in rapid and appropriate response.

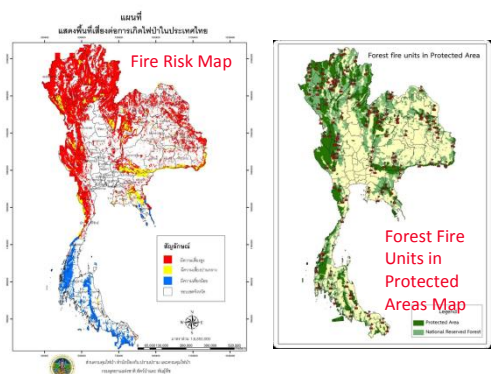
The current normal practice is to “build up” resources to the size of the fire. This means that small fires are allocated small amounts of fire suppression resource and attention. Only when the situation escalates are more resources then deployed to suppress it. This is counter-effective for lowering costs of peatland fires as they can burn uncontrollably for days and even months if not extinguished rapidly (preferably within 24-48 hours of ignition). Therefore, a change to the old ways is recommended - to “ramp up early” the resources to suppress the fire rapidly when it is still small.

As seen in Figure 3, although the upfront cost is higher, rapid fire suppression will result in overall savings of money and manpower and reduction in peatland or forest area burnt, and enable resources to be redeployed to fight other fires in the province and country.

## Information & Knowledge

To respond rapidly to a fire, the fire-fighting forces must be armed with information that will enable them to deploy rapidly, as well as have their equipment and training in order. Thailand’s fire-fighting teams called “Fire Tigers” and “Red Ants” are well trained, well prepared and prepare themselves for the coming fire season with

maps,



**Figure 4** (Image Courtesy of Department of National Parks, Forest Fire Control Division, Thailand)

communications equipment, and training exercises to test their deployment and response capability.

Using the information collected during the prevention stages, maps of high fire risk areas and location of fire-fighters and fire-fighting resources can be created for the area of interest and distributed to relevant stakeholders. The maps in Figure 4 show this in practice in Thailand.

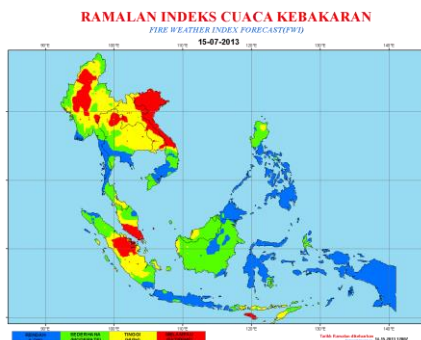
Information such as access roads and their condition, water access points and important contact details for emergency purposes (e.g. hospitals, local fire managers, etc.) can also be updated.

## Fire Danger Rating Systems and Hotspots

As the season changes from wet to dry, part of the landscape will become more susceptible to fire. ASEAN has the capability to predict fire risk *via* the Fire Danger Rating System (FDRS). FDRS acts as an early warning system to begin preparation for the coming fire season.

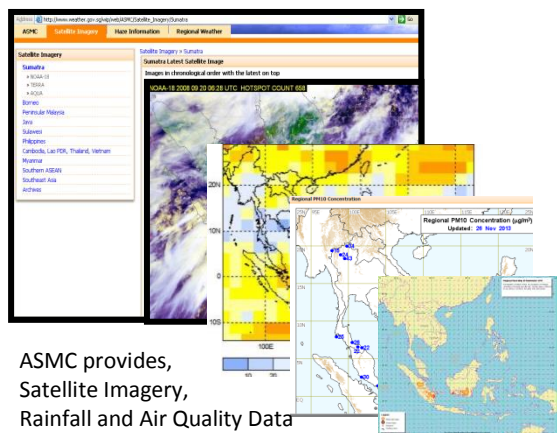
Additionally, ASEAN has access to daily hotspot information. The FDRS and hotspot information are updated daily and are publicly available on the ASEAN Specialised Meteorological Center and Malaysian Meteorological Department websites (web links stated below).

From: [http://www.met.gov.my/index.php?option=com\\_content&task=view&id=4717&Itemid=1157](http://www.met.gov.my/index.php?option=com_content&task=view&id=4717&Itemid=1157)



Fire Danger Rating Map

From: <http://www.weather.gov.sg/wip/web/ASMC>



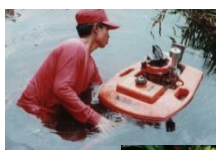
ASMC provides,  
Satellite Imagery,  
Rainfall and Air Quality Data  
Hotspot Coordinates and the Regional Haze Map

Hotspot data indicates the potential for a fire to be present near the hotspot. However, as not all hotspots are fires, ground verification efforts are still required to confirm the presence of a fire. Conversely, some fires occur and are not captured by hotspot satellite imagery. This prompts the need for ASEAN to develop better systems to review and refine the fire detection and verification capabilities. Further effort can also be expended on more research into remote validation systems.

## Planning and Coordination

With the onset of dry weather conditions, key personnel identified in the pre-determined command and control plan need to be called back to station posts for stand-by and resources should be prepared for immediate deployment when called upon.

Simulation and Table-Top Exercises can be conducted at regular intervals to ensure all equipment are operationally ready and to familiarize stakeholders with existing and new SOPs and other proceedings in the event of a fire. Lastly, networking sessions can also be held to familiarise stakeholders with important contact points and enhance camaraderie and support to obtain the necessary assistance.



Equipment Check and Maintenance



Briefing and Networking Sessions



Fire Suppression Mobilization Plans

Images courtesy of Department of National Parks, Forest Fire Control Division, Thailand

Frequent and coordinated patrols of high risk areas corresponding with the FDRS should be conducted. During patrols, fire-fighters can update maps and access points and high risk areas, as well as report

suspicious people who may be involved in burning activities to relevant authorities and local fire-fighting teams.



Aerial Patrol



Lookout  
Tower



Plan and Test  
Communication  
Systems



Ground Patrol: Foot, Bike and Boat

Images courtesy of Department of National Parks, Forest Fire Control Division, Thailand, Olle Wennstrom, APRIL Group and Mark Hale

## Resources

Image courtesy of: [www.mytractorforum.com](http://www.mytractorforum.com)

Specialized equipment is needed on peat soils, some of which are readily used in ASEAN while other items are not widely adopted yet. Specialized heavy equipment resources to improve capacity can be obtained from reliable third parties through various forms of government-supported or company agreements. Companies that operate tractors and excavators with wide tracks suitable for use on peatlands are potential partners. As peat soil is soft, caution must be used when moving heavy machinery into peat forests as standard excavators and tractors will get bogged down easily and become ineffective.



Joint fire-fighting training between various stakeholders is a way to share knowledge and understanding. Preparation training should be intensified before the onset of the fire season. Volunteer, company and government fire-fighters should be recruited to join in the agency/



community training sessions. During this period, training can include, but is not limited to:

- Fire-fighter and community safety in a fire situation
- Types of fire-fighting control equipment (use and maintenance)
- Understanding fire behavior (peatland and mineral soil fires)
- Construction of fire breaks and containment features
- Water management to control peat fires
- Communication within each team and between teams of fire-fighters
- Logistics for food, water, fuel and supplies to support fire-fighting
- Strategies and tactics to fight a fire; and
- Reporting the current situation (SitRep)

Images courtesy of Dr Bob Fisher and Department of National Parks, Forest Fire Control Division, Thailand



Community Fire Break



Teamwork at a Fire



Testing Equipment

Available technologies can be used to benefit the fire-fighter. Fire detection systems such as the Forward Looking Infra-Red (FLIR) cameras can be also fitted onto planes to quickly identify and map smaller smoldering fires.



Standard camera view



FLIR view (fire spots glowing brightly)

Image courtesy of FLIR Systems showing peatland smoldering fire

# Public Communications

Public education on the dangers of using fires during dry weather and the importance of staying vigilant can help to create social norms to reduce the incidence of fire ignitions. The public can also be urged to report fires and suspicious activities to the relevant authorities for follow-up.

Daily weather reports and media releases from National Meteorological Agencies should also incorporate FDRS information on dry weather conditions and outlook. Instructions to the public on ways to reduce fire ignitions can be shared on the evening news media.

FDRS boards can be installed in communities at prominent locations and updated daily. The community must be informed of the purpose of the FDRS, interpretation of the colours and recommended course of actions.

To enable the public to register their feedback and report on fires and suspicious activities, public feedback systems such as telephone hotlines, text messaging systems and smart phone apps must be set up to capture local information. This is especially important, as well as difficult, in rural areas where mobile network conditions may be poor. Establishing rural fire outposts (used in Thailand) or a village representative who has the communication equipment is important for sending and receiving community information about fires.

Today, Tue, 16 Dec 2014

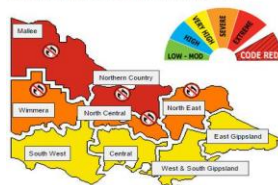
[Print bans & ratings](#)

Today, Tue, 16 Dec 2014 has been declared a day of Total Fire Ban in the Mallee, Wimmera, Northern Country, North Central and North East district(s) of Victoria.

No fires can be lit or be allowed to remain alight in the open air from 12:01 AM on Tue, 16 Dec 2014 until 11:59 PM Tue, 16 Dec 2014.

Total fire ban & Fire danger ratings map

Select a district to see a list of municipalities:



Displays when Total Fire Ban in force - Check what you can and can't do on days of Total Fire Ban

Bureau of Meteorology forecast issued at:  
Tue, 16 Dec 2014 05:30 AM

Total fire ban & Fire danger ratings map listing

Select a district to see a list of municipalities

District	Total Fire Ban declared?	Rating
Mallee	Yes - Total fire ban in force	Extreme
Wimmera	Yes - Total fire ban in force	Severe
South West	No - restrictions may apply	Very high
Northern Country	Yes - Total fire ban in force	Extreme
North Central	Yes - Total fire ban in force	Severe
Central	No - restrictions may apply	Very high
North East	Yes - Total fire ban in force	Severe
West and South Gippsland	No - restrictions may apply	Very high
East Gippsland	No - restrictions may apply	Very high

Example of a media release for the declaration of a Total Fire Ban and Fire Danger Ratings map (of Victoria, Australia).  
By Bureau of Meteorology, Australia



Images courtesy of Department of National Parks, Forest Fire Control Division, Thailand



# RESPONSE

## Policies and Regulations

The development of suppression response policies and regulations is often partnered and matched with organizational performance indicators, so that the public and government can review expectations and make additions and changes as performance and measures are improved. For example, once a fire is detected, guidelines on the expected time period which a fire of a certain size should be suppressed can be used as a “Performance Indicator”. These targets must be set appropriately and realistically to set the right expectations for both the fire-fighting crew and public stakeholders.

The fire-fighting crew and public can also take these indicators as a benchmark and a goal to achieve for motivation purposes. Some form of reward or recognition can be given if performance indicators are achieved by any fire suppression team or community group. These teams can then be invited to other areas to conduct training and share their best practices to improve the capability and capacity across the country.

## Information and Knowledge

Fire situation reports (SitReps) are important for decision-making and needs analysis for an ongoing fire. A SitRep should be prepared each day for a fire and sent to the headquarters to update on resource needs and expected outcomes. A simple and intuitive template could aid reporting procedures to capture critical information for a current fire as well as future references.

FIRE SITUATION REPORT FORM

Initial report or situation update (number)

Fire Information

Fire Name

Fire Number

Date

Time

Administration

Fire report from: (person, lookout, aircraft)

Contact Phone of person reporting fire

Person receiving fire report (Name and office)

Contact phone of person receiving report of a fire

Fire Agency and Person in Command and Control

Agency

Person in Command

Contact Phone

Fire Location

State

District

Forest Reserve

GPS Coordinates

Estimate of Area Burnt

Map Attached?

Yes

No

Directions to the fire

Fire Type

Type of Fire

Smouldering

Open Flame

Fast moving

Slope

Flat

Moderate

Steep

What is burning

Grassland

Shrub

Open

Degraded Forest

Closed Forest

Crop

Palm Plantation

Is water available

Yes

No

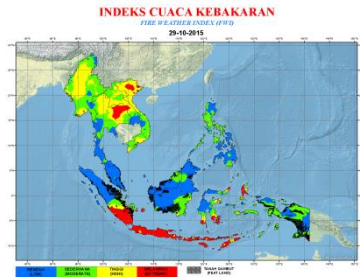
How far is water (M or KM)

Example of a Fire Situation Report Form (courtesy of Spatial Informatics Group)

Information can include location, type, administrative information, fire agency, person in command and control, resources present and additional control resources required, loss and damage information, and finally whether the fire appears “suspicious” and if further investigation of the fire cause is warranted.

Fire Agencies should also have a direct line of contact with Meteorological Agencies to keep abreast of the weather situation and forecast, FDRS and hotspot information. Aerial and ground patrols should also report on conditions and necessary measures that could be taken to stop a fire’s advance or prevent additional ignitions.

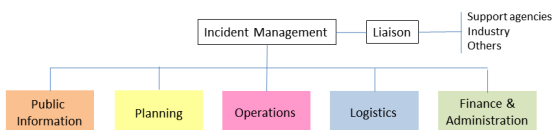
Images courtesy of ASEAN Specialised Meteorological Centre



## Planning and Coordination

Once a hotspot is verified as a fire, an Initial Response Plan must be activated quickly. This is done using the “pre-determined” suppression mobilization plan developed in the Preparedness stage. ASEAN countries could adopt the Incident Command System for managing emergency fire teams, so that both a mobilization plan and standard fire management team can all be in place rapidly. An example of an Integrated Command System team structure and contacts as well as a location map to send with a rapid response fire-fighting crew can be found below.

Incident Command Team



Name	Agency	Role	Emergency Phone Contact
Raj	Conservation	Commander	1234 5671
Faizal	Forestry	Planning	1234 5672
Mark	Forestry	Logistics	1234 5673
Brett	Local govt	Operations	1234 5674

Images courtesy of GEC

Following an “initial response”, if the fire needs additional time and resources, the Incident Commander (IC) would then develop a “main suppression” plan - a more detailed plan considering suppression strategies, water sources on-site, equipment and personnel availability, access routes, nearby assets and backup plan. These plans have to be created very quickly and require specially trained staff to develop them. The image shown is an example of a “main suppression” plan map developed for a peatland fire in the US. It used peat embankments and surface flooding to slow and stop the fire.

As part of the acquired information, the Incident Commander and planning team could consider whether additional support and resources are required and whether the pre-established contracts with third parties such as other government agencies, private companies and community teams should be activated to support the efforts.



Image courtesy of Mark Hale

## Resources

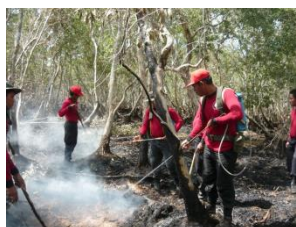
Due to the nature of the peatland fires, a combination of basic hand tools and people operating specialised equipment are required.

Specialised equipment can be used to ferry people, excavators and water to remote peatland sites to create peat mounds for flooding small areas or “mixing” peat and water to wet the smouldering peat below the surface.

Helicopters can be used to drop water on small sections of a fire to slow a fire's advance. But in all circumstances, a helicopter must be supported by ground-based field crews and heavy equipment to stop the fire. A helicopter can be "quick to respond" and slow the advancement of the fire until ground fire-fighters arrive.



Images courtesy of Cabinet Secretary, Republic of Indonesia



Commonly use tools such as hand tools, water backpacks and water pumpers



Specialised carriers with wide tracks to move crew and other supplies in and out of peatland



Excavators to mix water into burning peat to extinguish it

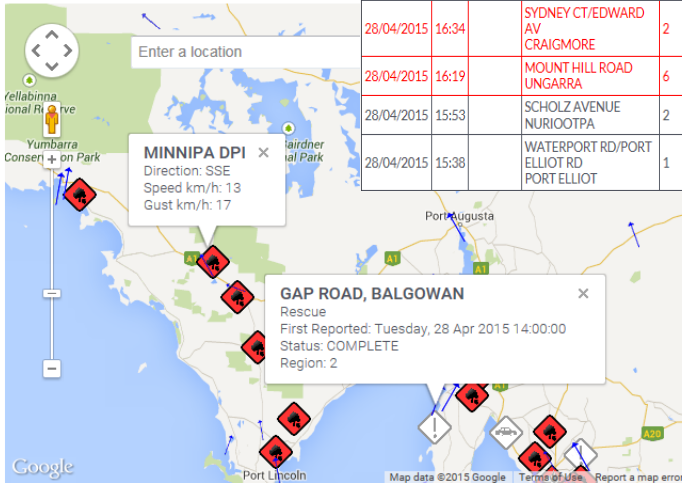
In peatlands it is very difficult to control fires once they have started. The best way to stop peat fires is through intensive attack and wherever possible flooding of the site by pumping water from adjacent areas.

## Public Communications

It is important to keep the public apprised of the ground situation so that they can avoid fire areas and determine what is best for their safety. Public health advisories can also be issued to caution the public about deteriorating air quality due to smoke.

## Listing of Current Major Incidents

### Current Incidents Map



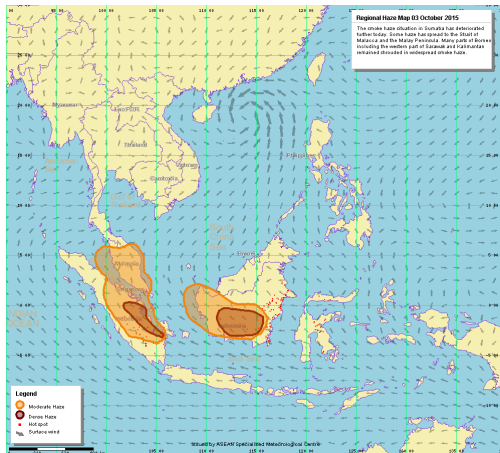
Date	Time	Message	Location Name	Region	Type	Status	Level	Resources	Aircraft	Show on Map
28/04/2015	16:34		SYDNEY CT/EDWARD AV CRAIGMORE	2	Building Fire	GOING	1	1	0	
28/04/2015	16:19		MOUNT HILL ROAD UNGARRA	6	Controlled Burn Off	GOING	1	0	0	
28/04/2015	15:53		SCHOLZ AVENUE NURIOOTPA	2	Fire Alarm	COMPLETE	1	0	0	
28/04/2015	15:38		WATERPORT RD/PORT ELLIOT RD PORT ELLIOT	1	Cleanup	COMPLETE	1	0	0	

The South Australian Country Fire Service has developed a web-based application to provide near-real time information on fires and incidents

Images courtesy of:



[http://www.cfs.sa.gov.au/site/warnings\\_and\\_incidents.jsp](http://www.cfs.sa.gov.au/site/warnings_and_incidents.jsp)



Public advisories warning about the extent of smoke (left) and the possible precautions to take according to PSI levels (right)

Images courtesy of: ASEAN Specialised Meteorological Centre (ASMC) and Ministry of Health, Singapore respectively

# Recovery

## Policies and Regulations

In general, very little or no effort is spent on peatland fire recovery in the majority of ASEAN Member States. For fire prone peatlands it is important to support ecological recovery of burnt sites as this will help to reduce future fire risk. In addition it is important that attention is given to careful management of social welfare since peatland fires are usually driven by social change and economic demand. The management of social recovery may reduce further damage to the ecosystems by opportunistic individuals.

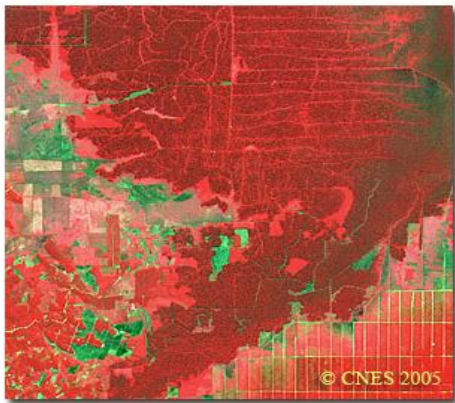
Some communities such as Harapan Jaya Village in Riau, Indonesia, have established village laws whereby if a villager had suffered crop damage and losses from fire due to the actions of another, the villager would be eligible to claim a certain amount of compensation from the perpetrator and this could be done during the recovery phase.

## Information and Knowledge

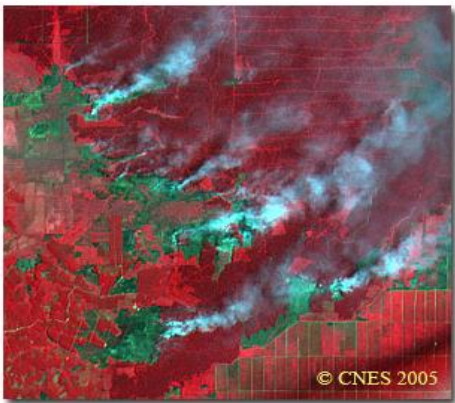
Before the Incident Commander and fire suppression managers conclude their work at a fire, they should deliver a report on the damages and losses dealt by the fires. The report would allow the government to gain a greater insight into the ground situation and make better informed decisions on supporting the post fire recovery efforts to guide amendments in the country's fire policy where required.

Burned areas can be plotted by comparing satellite imagery before and after the fire incident to determine vegetation loss and soil exposure. See the images below that can be used for these wide-scale assessments.

More than half of the area of the scene (above right) has burnt or is burning. Dense forest areas appear as dark red patches with a rough texture, while the lighter red or pink patches are probably secondary forest or scrub. Note that forest areas are burning in the centre right of the image on Aug 8.



17 Jun 2005, 12 km X 12 km



8 Aug 2005, 12 km X 12 km

Images and caption courtesy of <http://www.crisp.nus.edu.sg/coverages/fires/index.html>

As fire is not a naturally occurring ecological process in tropical forests, investigations into the origin of the fire will be useful to understand the underlying reasons and perpetrators of the fires. It is also important to identify and prosecute the perpetrators to ensure effective deterrence against forest fires.

The Jakarta Post

# Record fine against plantation company upheld

Hans Nicholas Jong, The Jakarta Post, Jakarta | Headlines | Sun, September 13 2015, 1:32 PM

Headlines News

Thousands displaced after

Boats, airlines hit

The Supreme Court has rejected an appeal by palm oil company PT Kallista Alam and ordered the company to pay fines totalling Rp 366 billion (US\$25.6 million) for illegally burning large swathes of the Tripa forest in Aceh, a verdict that many hope could set a precedent for future

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## Planning and Coordination

Based on the data collected, a Burned Area Post Emergency Response Team comprising specialists such as hydrologists, foresters, ecologists, engineers, social scientists (community engagement experts), economists and others, should be engaged by the government to assess the damage and losses, and recommend timely and cost-effective treatments to enable affected areas to recover.

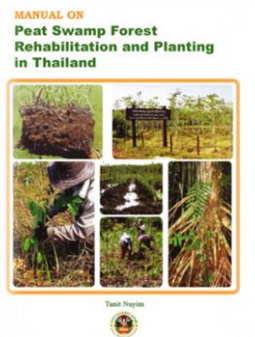
These areas should then be prioritized according to certain criteria set out by internal policy decisions. Coordinating Agencies/Ministries should then gather the necessary resources and recommendations so that the state/provincial government in-charge can repair and rehabilitate the site.

## Resources

Resources such as seeds and seedlings, and the construction of new infrastructure, should be provided for, to rehabilitate affected areas through replanting, reforestation, and the restoration of water levels.



Research can also be conducted to determine optimal planting methods which could be replicated throughout similar ecological sites. A rehabilitation and planting manual can also be developed to provide guidance to field and volunteer teams.



Images courtesy of Department of National Parks, Forest Fire Control Division, Thailand and the Ministry of Environment and Forestry, Indonesia



If applicable, humanitarian and social groups should also be allowed to set up centres to deliver aid and support to affected communities.

## **Public Communications**

Public engagement and education of the public on the importance of the continued protection and rehabilitation of the damaged peatland forests is necessary. This is to ensure that there is a continued sense of ownership and empowerment to protect the remaining landscape despite the changes.

This effort can be supported by providing the public with information on various environmental and social support assistance programmes. If volunteers are available, resources could also be distributed to them to facilitate the rehabilitation efforts.

# Conclusion

Good fire management within the peatlands is crucial to protect natural capital, forest ecosystems and air quality, and sustain the peatland ecosystems into the future. These guidelines seek to raise awareness for some of the key fire management strategies practiced in various ASEAN countries. While these strategies may not be directly applicable to all ASEAN Member States, it provides a good reference point for ASEAN Member States to work upon and refine further.

The use of a holistic cycle such as Integrated Fire Management (IFM) planning, coupled with Community Based Fire Management (CBFiM) planning, is a valuable and useful first step, to draft out the landscape according to local knowledge and the plans for it to manage and sustain the peatland ecosystems and protect them from fire.

An important aspect to note during the creation of the fire management system is that the combined efforts of the resources (people, equipment, money and time) must be applied to each section of the system. A failure to emphasise the prevention and preparedness aspects of fire management (even if there are only limited resources to begin with) will cause the continued cycle of unwanted fire to spread across the wider peatland landscapes.

A quick summary of the key points covered in this guideline is attached on page 35 for quick reference:

## Overview: ASEAN Guidelines on Peatland Fire Management

	PREVENTION	PREPAREDNESS	RESPONSE	RECOVERY
POLICIES & REGULATIONS	<ul style="list-style-type: none"> <li>Clearly defined land tenure</li> <li>Include management of peatland as a hydrological unit under spatial law</li> <li>Need for adequate regulation enforcement, auditing of compliance, and fines for non-compliance</li> </ul>	<ul style="list-style-type: none"> <li>Develop pre-allocated funds and ensure accessibility before a fire emergency</li> <li>Introduce concept of allocating more resources (funds) to aggressively conduct “initial attack” on a fire.</li> </ul>	<ul style="list-style-type: none"> <li>Establish management performance indicators e.g. Response to fires within set time period, Reduce number of fires starts/ per district, Reduce PSI reading for the season</li> </ul>	<ul style="list-style-type: none"> <li>Welfare and support assistance for people</li> <li>Environmental rehabilitation</li> </ul>
INFO & KNOWLEDGE	<ul style="list-style-type: none"> <li>Landscape fire history, behavior &amp; knowledge of fire use</li> <li>Communities – Demographics, number of communities, size, socio-economic situation.</li> <li>Landscape mapping, topography, vegetation, roads , rivers, water points and more</li> </ul>	<ul style="list-style-type: none"> <li>Weather, Climate, Fire Danger Rating and Hotspot data used to predict and prepare for coming issues</li> <li>Map high fire risk areas and location of nearest fire-fighting resources (Government, Private Company or Community).</li> </ul>	<ul style="list-style-type: none"> <li>Daily situation reports (SitReps)</li> <li>Fire Science information - e.g. daily weather reports, Fire Danger Rating, hydrology, expected fire behavior</li> </ul>	<ul style="list-style-type: none"> <li>Loss assessment calculations</li> <li>Investigation reporting</li> </ul>
PLANNING & COORDINATION	<ul style="list-style-type: none"> <li>Develop an Integrated Fire Management (IFM) Plan, that has embedded Community Based Fire Management (CBFiM) planning, and coordinate activities amongst stakeholders</li> <li>Establish inter-agency task force (Government, Private Company and Community) and appoint lead people to coordinate inter-agency prevention efforts</li> <li>Set up a pre-defined Incident Command System to develop suitable response efforts</li> </ul>	<ul style="list-style-type: none"> <li>Ramp up preparatory activities once FDRS indicates dry weather conditions, such as activating more frequent and coordinated patrols</li> <li>Pre-define trigger levels to allocate more resources to aggressively attack fires at the initial stage</li> <li>Simulation exercises - to test all equipment, improve effectiveness of fire-fighters, develop better communications and coordination for fire management responses and better SOPs</li> </ul>	<ul style="list-style-type: none"> <li>Activation of “Initial Response Plan” and using the Incident Command System</li> <li>Rapid development of “Main Suppression” Plans, i.e. landscape approach and use of dykes to flooding of fires</li> <li>Additional support and coordination of resources ready to be deployed from cooperative agencies and adjacent districts or provinces</li> </ul>	<ul style="list-style-type: none"> <li>Develop rehabilitation plans for human welfare, environmental landscapes and economic recovery for infrastructure losses</li> </ul>
RESOURCES	<ul style="list-style-type: none"> <li>Proactive management of peatland hydrology via canal blocking, canal closure &amp; changing land use away from cropping systems that need drainage</li> <li>Develop and deliver training – e.g. in sustainable agriculture practices; fire plan development, construction of fire breaks, alternative mechanisms for land management without fire</li> <li>Appoint teams of Fire Prevention Officers, who work in the field and are coordinated in activities across the landscape by the “inter-agency task force”</li> </ul>	<ul style="list-style-type: none"> <li>Ensure sufficient and serviceable supplies of fire-fighting equipment and plan access routes to water supply for fire-fighting</li> <li>Pre-established contract agreements with third parties on required resources (e.g. excavators, tractors)</li> <li>Hire temporary fire-fighters</li> <li>Intensified training for all fire-fighters</li> </ul>	<ul style="list-style-type: none"> <li>Use the rapid initial attack method on all fires to reduce the overall costs and losses</li> <li>Use appropriate and specialized equipment</li> <li>Ensure basic fire-fighting supplies are available</li> <li>Implement Incident Command System to manage fires</li> </ul>	<ul style="list-style-type: none"> <li>Human: Welfare support and assistance during and immediately after a fire</li> <li>Environmental: Provision of seeds; hydrological management</li> <li>Economic: complete infrastructure assessments and reconstruction programs</li> </ul>
PUBLIC COMMS	<ul style="list-style-type: none"> <li>Educate people in the use and improper use of fire, the dangers to human health from smoke haze; create awareness via broadcast media and correctly targeted programs</li> <li>Provide information on alternative land management techniques and equipment without the use of fire</li> </ul>	<ul style="list-style-type: none"> <li>Develop a range of communication tools that work via website, text, smart phone apps and via Village Networks</li> <li>Daily reporting of FDRS for early warning</li> <li>Establish hotlines and specialised communication mechanisms to report fire incidents</li> </ul>	<ul style="list-style-type: none"> <li>Public communication via broadcast media – e.g. information update on fires; danger areas to be avoided; public health messages and advisories</li> </ul>	<ul style="list-style-type: none"> <li>Well targeted education and development programs</li> <li>Community outreach program</li> <li>Provide information on available support and assistance programs</li> </ul>

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