



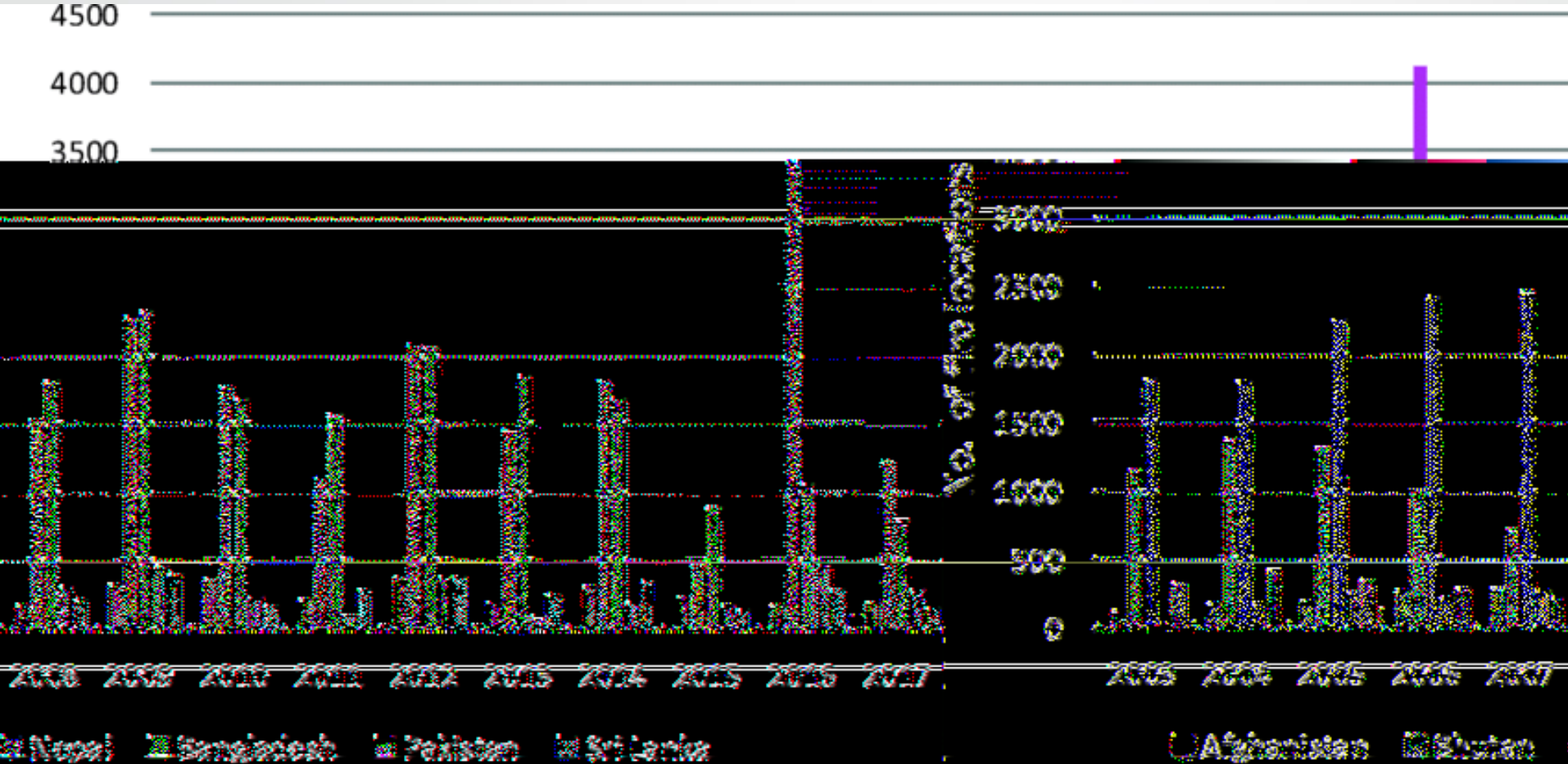
**Capacity Development packages for
Myanmar to support the MAHFAS program**

**Fire Risk Warning (including FDRS) and fire
prevention**

Outline

- Distribution of forest fire occurrences in South East Asia
- The Fire Danger Rating System (FDRS)
- Causes of Land and Forest Fire in Peatland Areas
- Type of Fire in Peatland and Peat Forest Areas
- Impact of Land and Forest Fire in Peatland Areas
- Strategy for the Control of Fire in Peat Lands and Peatland Forest
- Fire Prevention
- Zero Burning

Distribution of forest fire occurrences in South East Asia



The Fire Danger Rating System (FDRS)

- The Fire Danger Rating System (FDRS) is a forest/vegetation fire monitoring system that provides information to support fire management.
- FDRS products are used as a guide to predict fire behaviour, with the objective to help stakeholders make informed decisions on fire mitigation and smoke haze pollution.
- FDRS uses measured meteorological variables such as temperature, relative humidity, rainfall and wind speed collected from meteorological stations in the Southeast Asia region.

Alert Levels

- In addition to its given mandate to serve as the designated regional centre for weather, climate, and haze monitoring, assessments, and outlooks, the ASMC provides early warning on the occurrence of transboundary haze in the ASEAN region.
- The early warning is issued in the form of an advisory according to a three-tier system as outlined below.
- When assessing the risk of transboundary haze occurrence, ASMC takes into consideration factors including forecast of meteorological conditions (rainfall and prevailing winds, etc), smoke haze density, and hotspot counts and location.

Alert Levels

Level 0

No transboundary smoke haze / Stand down

Level 1

Dry season.

Level 2

Increasing risk of transboundary haze in the region:

- Escalating hotspot activities with moderate to dense smoke haze observed over 2 or more consecutive days;
- Dry weather persisting;
- Prevailing winds blowing smoke haze from the hotspots towards neighbouring ASEAN countries.

Level 3

High risk of severe transboundary haze in the region.

- Significant and persistent hotspot activities with widespread moderate to dense smoke haze observed over 2 or more consecutive days;
- Dry weather persisting;

Causes of Land and Forest Fire in Peatland Areas

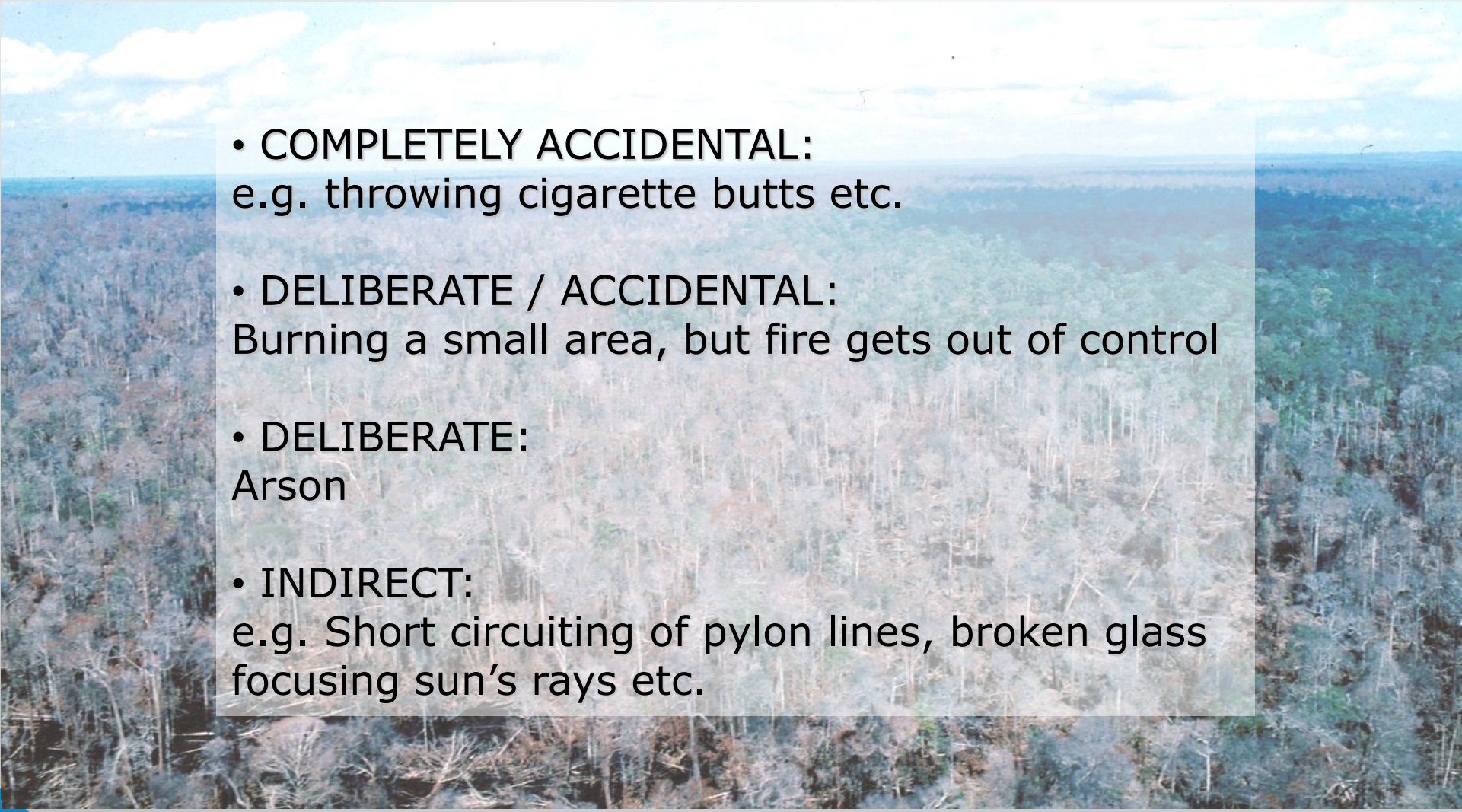
- In general, the cause of land and forest fires in Indonesia is 99.9% human, 0.1% is due to natural causes (lightning, volcanic lava).
- Human causes of fire can be categorized as follows:
 - ✓ Land conversion:
 - ✓ Burning of vegetation:
 - ✓ Exploitation of natural resources:
 - ✓ Construction of canals/channels in peatland.
 - ✓ Land rights/ownership

Basic points: fires start in drained and degraded areas, very, very rarely in undisturbed peat swamp forest



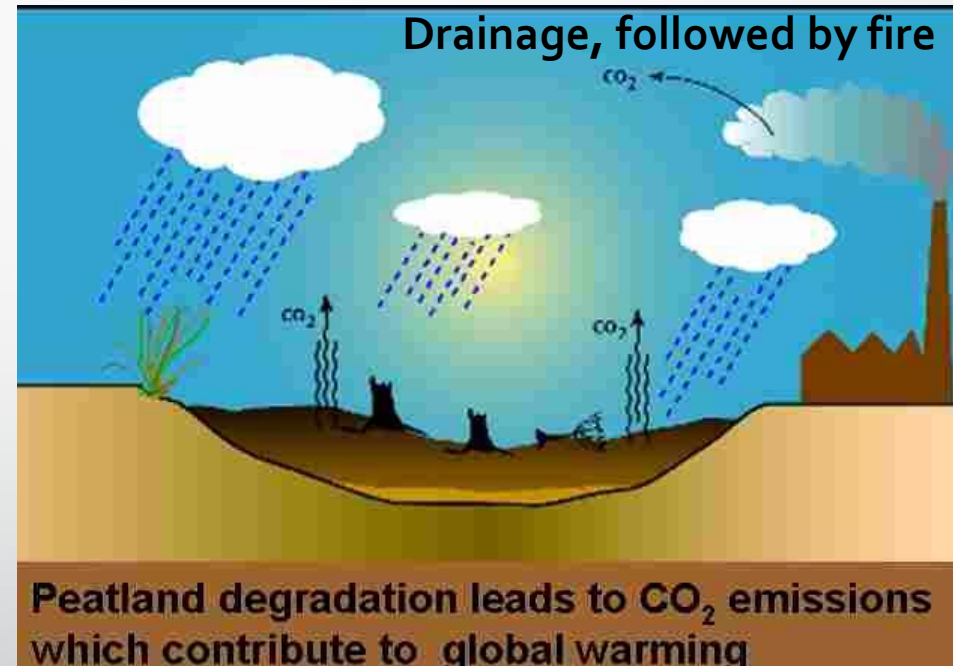
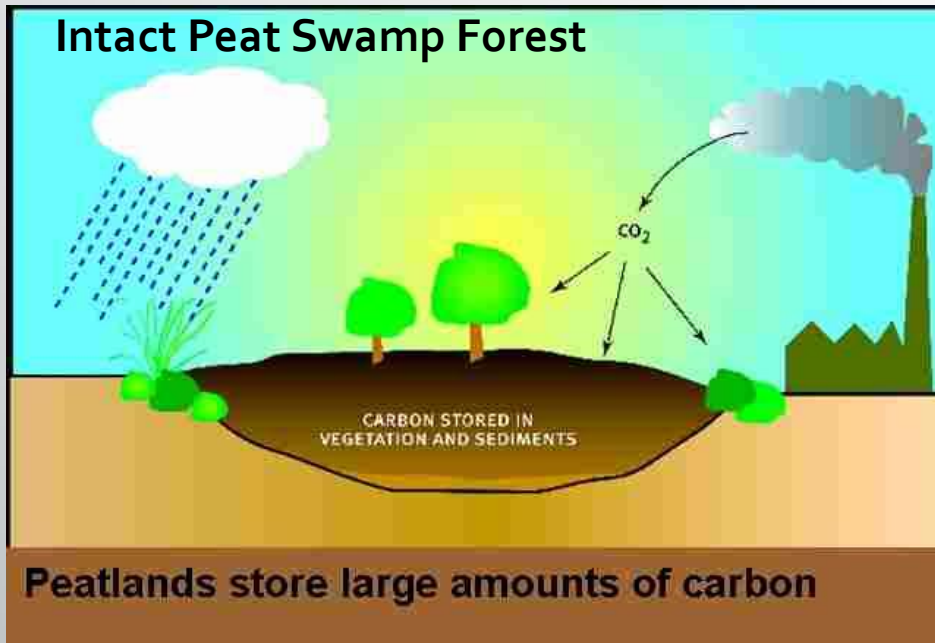
Almost all fires are started by humans

Possible Causes of Fire in Peatlands

- 
- **COMPLETELY ACCIDENTAL:**
e.g. throwing cigarette butts etc.
 - **DELIBERATE / ACCIDENTAL:**
Burning a small area, but fire gets out of control
 - **DELIBERATE:**
Arson
 - **INDIRECT:**
e.g. Short circuiting of pylon lines, broken glass focusing sun's rays etc.

Effect of Drainage and Fire on Peat Swamp Forest

At a global scale, CO₂ emission from peat land drainage alone in Southeast Asia is contributing the equivalent of 1.3% to 3.1% of current global CO₂ emissions from the combustion of fossil fuel.



Carbon Losses Enormous in Fire Events

Estimates from 1997/1998: Central Kalimantan (Page, 2002)

Depth of peat burnt off: 25 – 85 cm (mean = 51 cm)

Single fire event:

Depth of 10 cm burnt off = Loss of 60 tonnes Carbon/ha =

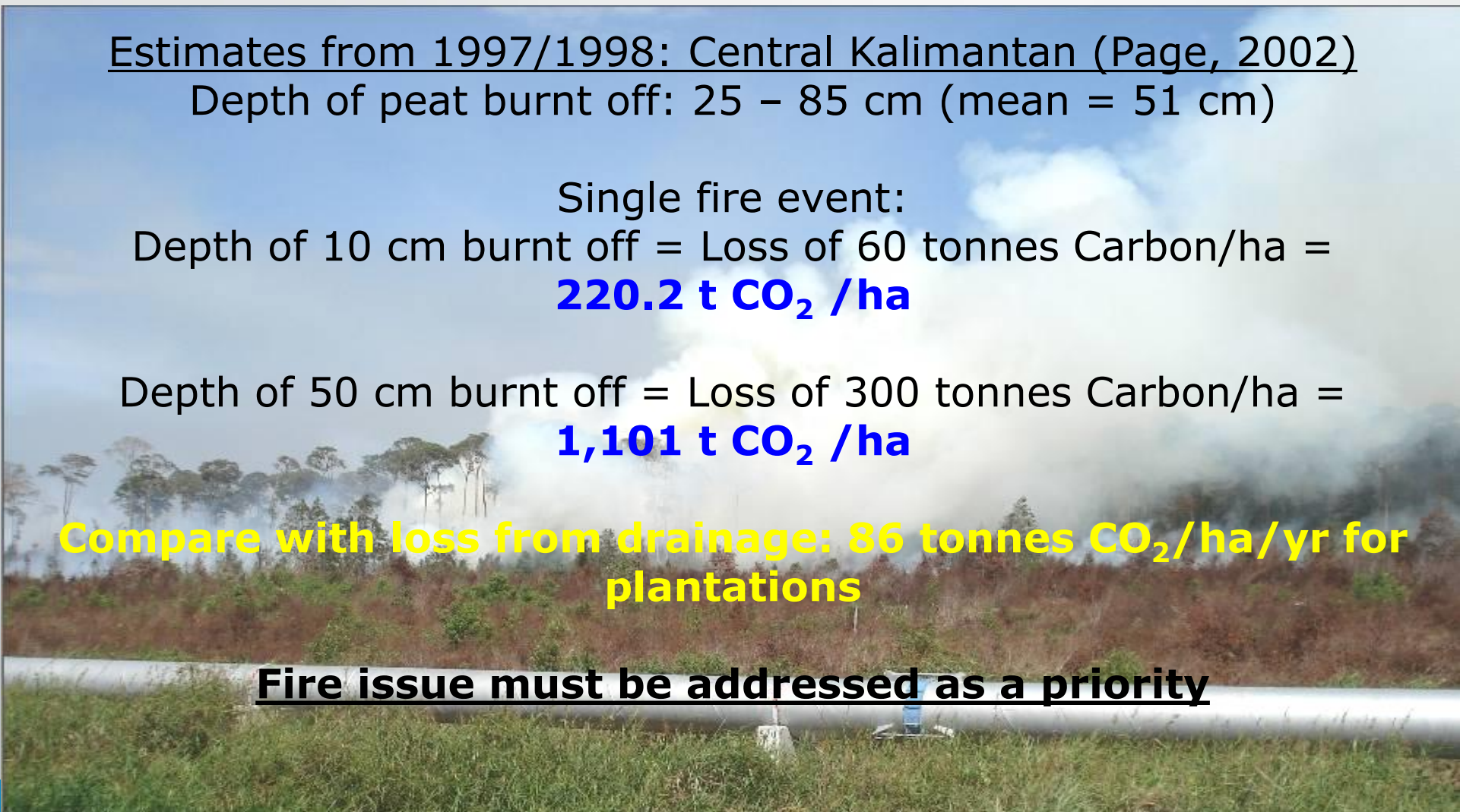
220.2 t CO₂ /ha

Depth of 50 cm burnt off = Loss of 300 tonnes Carbon/ha =

1,101 t CO₂ /ha

Compare with loss from drainage: 86 tonnes CO₂/ha/yr for plantations

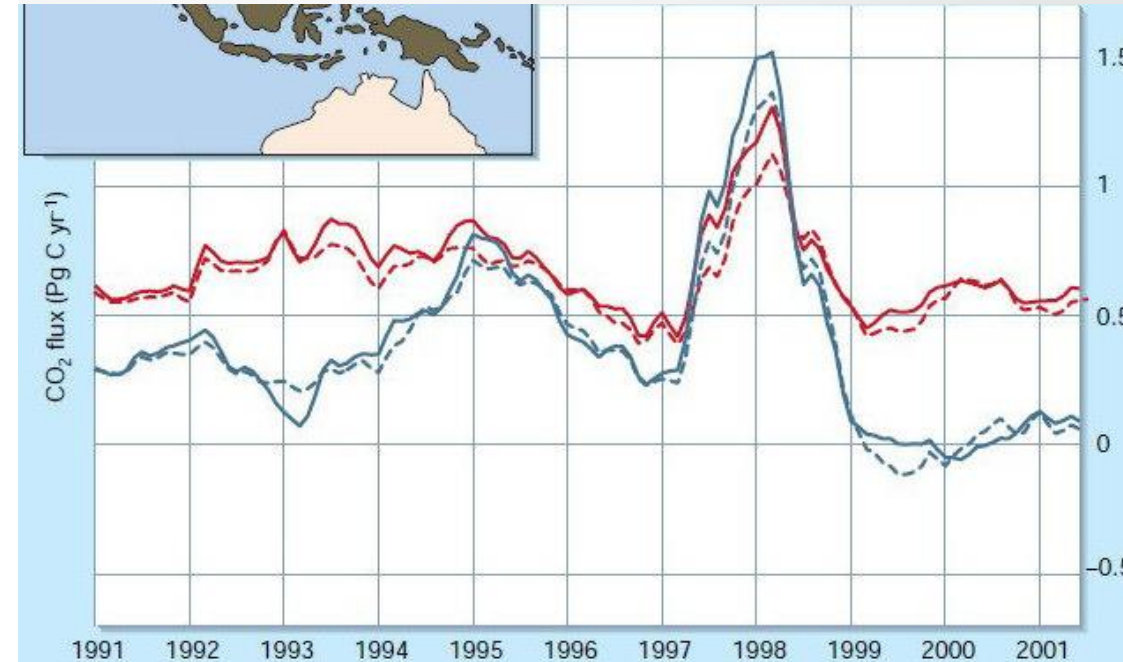
Fire issue must be addressed as a priority



Emissions from Degrading Peat by Country in 2008

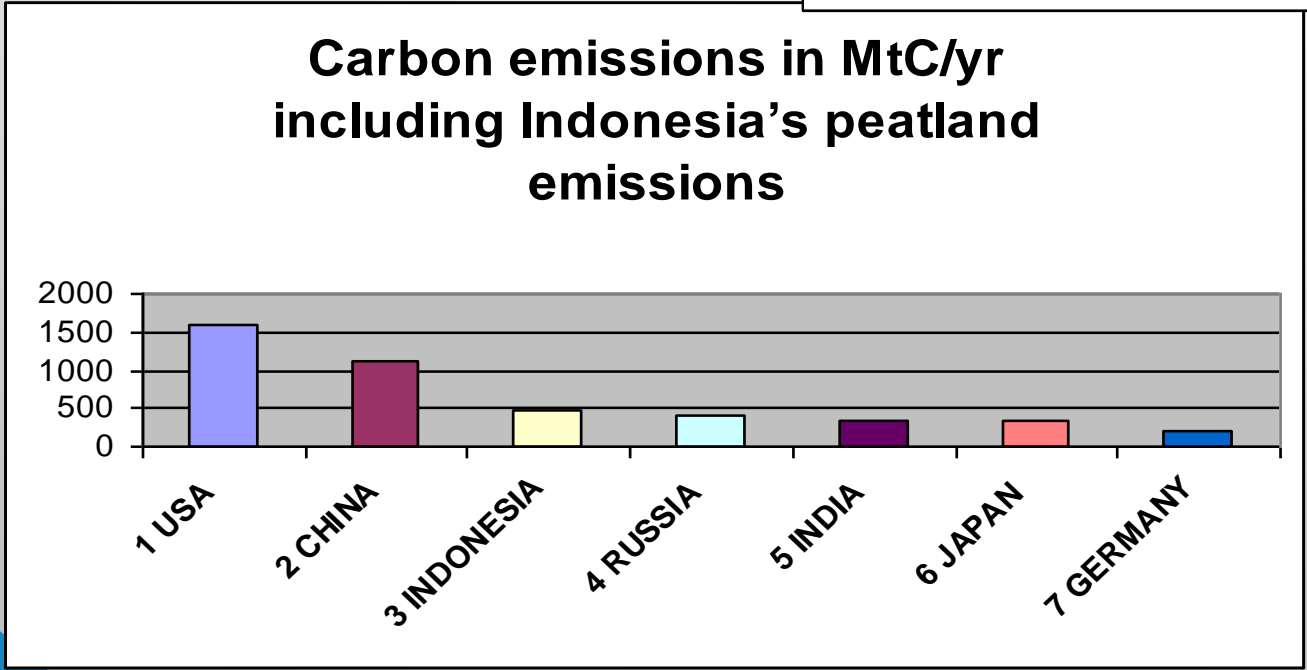
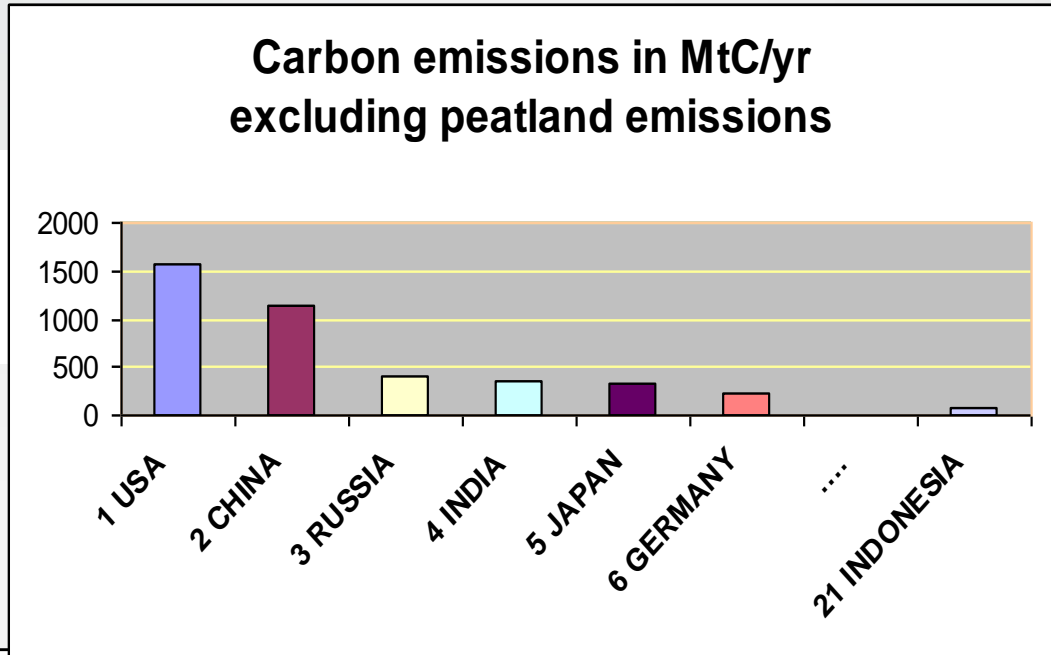
	Country/area	Emissions from degrading peat 2008 (Mton CO ₂ /a)
1	Indonesia	500
2	Russia European part	139
3	China	77
4	USA (lower 48)	67
5	Finland	50
6	Malaysia	48

Source: Kaat, A & Joosten H (2009) Vernada



The Global CO₂ Pulse in late 1997/ early 1998 was probably a result of the forest fires in Southeast Asia

In 1997/1998, Indonesia was the third highest emitter of CO₂ globally



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Fire issue must be addressed as a priority

Fires can start in non-peat areas and move into peat land areas

Fires are started on sand ridges and move into intact peat swamp forest

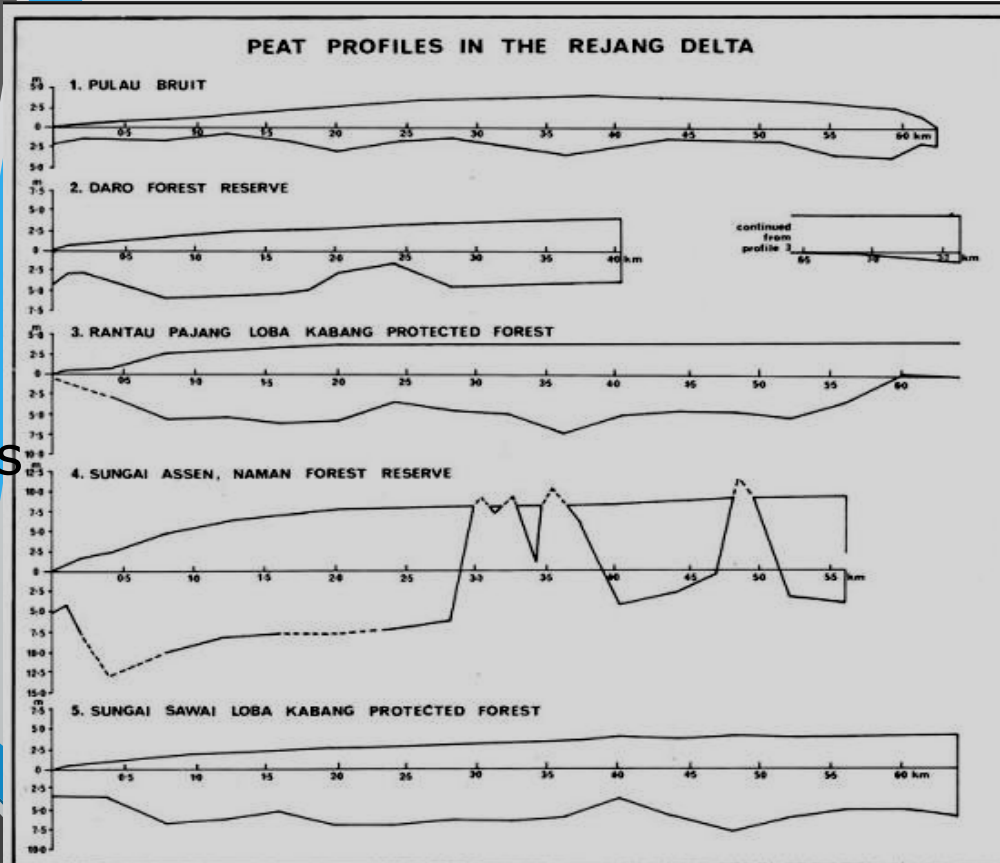
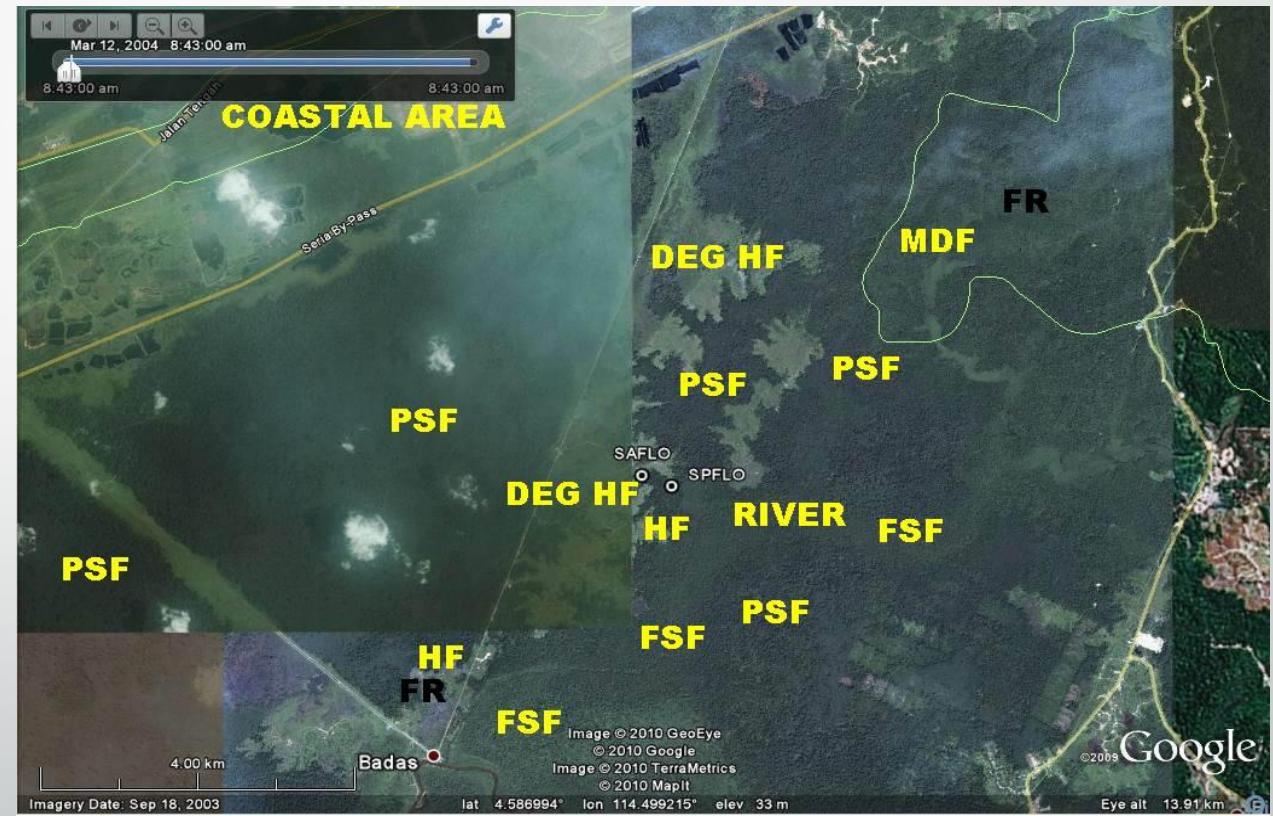


Fig. 6.2. Some peat profiles from the Rejang Delta, Sarawak. Profile 1 represents a recently formed coastal swamp which has no developed a significant bog plain. The other profiles show more highly developed swamps, particularly profile 4 which was the most



Sand ridges

Fires started on sand ridges burn margins of intact peat swamp forest



Address land use practices in land surrounding peat swamp forest



Type of Fire in Peatland and Peat Forest Areas

- Fire in peatland areas is categorized as ground fire.
- Fire spreads unpredictably and slowly because it is not affected by wind; smouldering beneath the surface, the organic matter burns without flame, giving rise to white smoke which is the fire's only visible sign above the surface.
- Ground fire does not happen of its own accord; usually the fire originates on the surface then spreads downwards burning organic matter through the pores of the peat, burning buried logs and spreading through the roots of undergrowth whose tops are burning.



Type of Fire in Peatland and Peat Forest Areas

- AS it develops, the fire spreads vertically and horizontally, like a chimney of smoke.
- Tree roots held by the peat burn, thus losing their grip on the soil, with the result that the trees topple over.
- Fallen trees whose crowns are still green are a common sign of peat fires.
- Peatland fires can only be completely extinguished if the whole layer of burning peat is inundated with water.



Source: <https://www.google.com/search?q=Exploitation+of+natural+resources+in+peat+land+for+peat+fire&tbm=isch&ved=>

Impact of Land and Forest Fire in Peatland Areas

- Land and forest fires in peatland areas have an obvious detrimental effect as regards degradation of the environment, human health and the socioeconomic conditions of the local communities.
 - Degradation of the environment
 - ✓ Decline in the physical quality of the peat. (reduction in total porosity, water content and permeability).
 - ✓ Changes to the peat's chemical characteristics
 - ✓ Peat stores carbon reserves

Impact of Land and Forest Fire in Peatland Areas

- Danger to human health
 - Impact of smoke on health
- Change in Socio-economic values
 - ✓ Peat stores carbon reserves
 - ✓ Timber Production
 - ✓ Transportation
 - ✓ Tourism
 - ✓ Fire-fighting Costs
 - ✓ Relations with Neighbouring Countries



Timber Production

Factors Supporting Incidence of Land and Forest Fires in Peatland Areas

- Climate Conditions
- Physical Conditions
- Economic, Social and Cultural Conditions

Climate Conditions

- Climate conditions, especially during periods of low rainfall, are one of the factors which increase the likelihood of fire.
- The risk of fire breaking out in peat land and forest is highest during the dry season, when rainfall is extremely low and the intensity of sunlight extremely high.
- Such conditions generally occur between June and October, and sometimes from May to November.
- The risk increases even further when the dry season coincides with the El Niño phenomenon.
- The risk of fire becomes low when the wet season has stabilised, with rain falling every day. Under these conditions, the peatland and forest become inundated with water and the saturated fuel is difficult to burn.

Physical Conditions

- The physical condition of degraded forest and land is one of the factors that can trigger fire.
- The degradation of peat land and forest is caused by illegal logging, and the conversion of peat land and forest for housing, rice fields, plantations and mining.
- The conversion of peat land and forest for housing, rice fields and plantations has encouraged the use of fire in land clearing
- Moreover, the presence of ditches/ channels constructed by the community to remove logs from the forest also degrades the forest even further. |
- The construction of canals and ditches has caused the peat to dry out excessively during the dry season and become damaged.
- Irreversible drying has taken place and the peat has changed in character becoming like charcoal, as a result of which it is no longer capable of absorbing nutrients nor of retaining water

Physical Conditions



Canal in PLG (Alue dohong – ccfpi.doc)



*Ditch on Simpang Kiri village
(Sumatera) (YRN – ccfpi.doc)*

Economic , Social and Cultural Conditions

- Peatland is generally swamp land which is poor in nutrients and inundated with water every year, as a result of which it is not suitable for agriculture.
- Thus, these conditions force the inhabitants to survive through hunting, fishing and illegal logging.
- Illegal logging had decreased slightly as, all the commercial species of tree in this area having been exhausted, the loggers now have to go deep into the forest where access is more difficult.
- The community have also become increasingly aware of the detrimental impact of illegal logging; this is partly a result of the awareness campaigns and advice from NGOs and government.



Strategy for the Control of Fire in Peat Lands and Peatland Forest

Fire control (Saharjo et al., 1999) ,Forest fire control comprises three activity components:

- To prevent forest fire from occurring
- To extinguish forest fires rapidly while they are still small
- To use fire only for certain purposes and on a limited scale

Fire Prevention

- Community based fire management will be better directed at prevention activities than at fire suppression.
- Prevention covers all work and activities which are aimed at stopping fires from breaking out.
- A component of forest fire control which covers all the ways of reducing or minimizing the number of wildfire incidents.
- It is not intended to eradicate all cases of wildfire.
- To completely eradicate all incidents of forest fire is extremely difficult and would be impossible to achieve.
- There are many fire incidents whose source is unknown or which derive from sources beyond the control capabilities of a forest fire control organisation

Fire Prevention

- As an activity which is inseparable from fire control, but whose success should be evaluated in the context of the success or failure of fire control as a whole.
- Prevention and suppression are complementary activities not substitutes. Neither is complete nor perfect, and they must be bridged by presuppression and fuel management activities.
- The most important early activity in fire control and is work which must be carried out continuously.
- The most economical way of reducing the damage and loss arising from fire, without having to use expensive equipment

Measures to Increase Local Community Participation in Land and Forest Fire Prevention

Increasing local community participation in the prevention of land and forest fire is influenced by a number of factors, i.e. : Motivation and Stimulus, Incentive, Opportunity, Capability, Guidance,



Fire Prevention

- Simple concept for preventing combustion from taking place is to remove one of the three components of the fire triangle.
- What can be done is to remove or at least reduce the sources of heat (fire) and remove or reduce the accumulation of fuel.
- Land and forest fire prevention consists of efforts to prevent or reduce fire from outside entering into the forest area or land, to prevent fire from occurring inside forest and land, and to restrict any fires which do occur from spreading further.



Fire Information System Approach

Types of Fire Information System

- Early Warning System
- Fire Danger Rating Sys
- Hot Spot Monitoring System

Fire Information Distribution

If from the results of the hot spot monitoring hot spots are detected, and the output from the early warning system (fire danger index) at central or regional level shows indications of fire occurring, the actions/measures which need to be taken are:

- Broadcast early warnings via the local media (print, radio) so that the target groups of forest-users, politicians, community and other land managers know that there will be an extended drought season with high fire potential
- Monitor activities around the land and forest, particularly fire-prone areas, by carrying out a daily patrol
- Broadcast a ban on burning
- Prepare, train and retrain all relevant officials and the community in fire-fighting measures

Fire Information Distribution

- Draw up a fire-suppression plan together with the community, NGOs and companies in the vicinity of the forest
- Ensure that fire-fighting equipment is available, ready and is all functioning properly
- Check the water sources for the fire-suppression plan
- Hold meetings and facilitate regular communication among the community, companies, NGOs and fire-fighters
- Carry out fire-suppression as early as possible whenever a fire source is found, however small it is.

Zero Burning

A method of land clearing which does not utilise fire, but is carried out by cutting down trees in secondary forest or old plantations (e.g. oil palm), then shredding them into chips which are then piled into heaps and left to decompose naturally.



Zero Burning in Peatland Area



Thank You!