



Refinement on Fire Danger Rating System (FDRS)

to Reduce Peat Fires in Malaysia

By MMD & DOE

ASEAN Technical Workshop on Development of the ASEAN Peatland Fire Prediction and Early Warning System

Kuala Lumpur, Malaysia

20 - 21 March 2012



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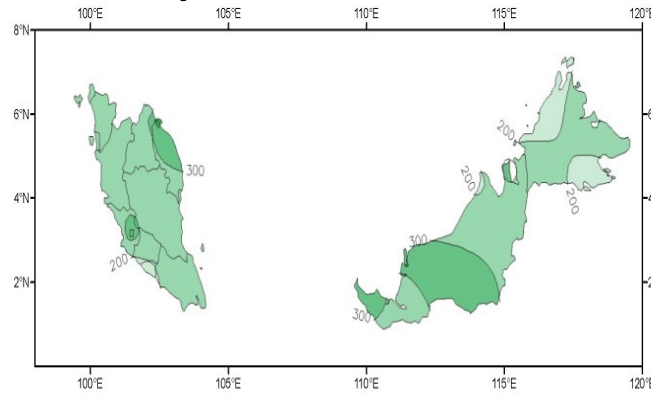
Development on Drought Monitoring, Fire Prediction and Early Warning System in Malaysia

Development on Drought Monitoring, Fire Prediction and Early Warning System in Malaysia.

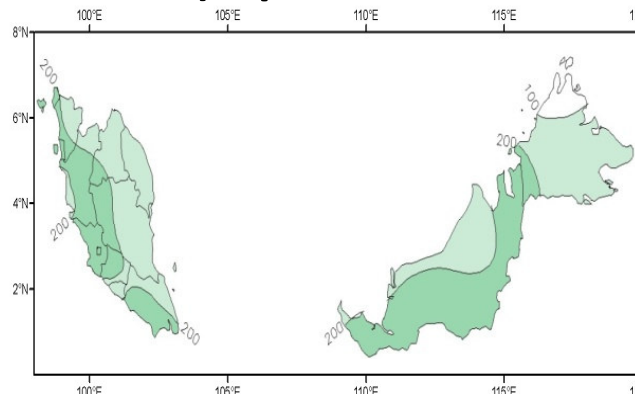
- **Seasonal Forecast**
- **Drought Monitoring (SPI)**
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non-raining days**
- **Satellite Hot Spot Monitoring**
- **Report by Environmental Studies Division
During haze condition.**
- **Watch Tower, Air & Land Surveillance**

Monthly Rainfall Prediction and Anomaly Percentage March – Mei 2012

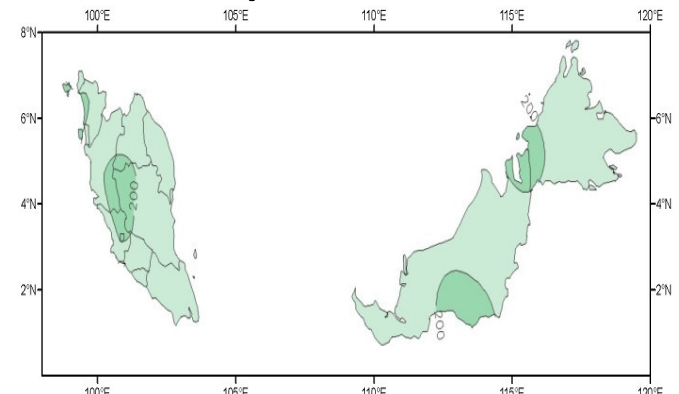
a) March 2012



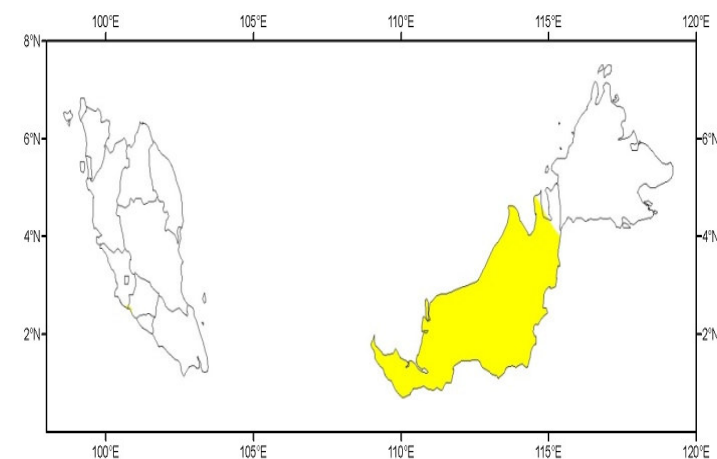
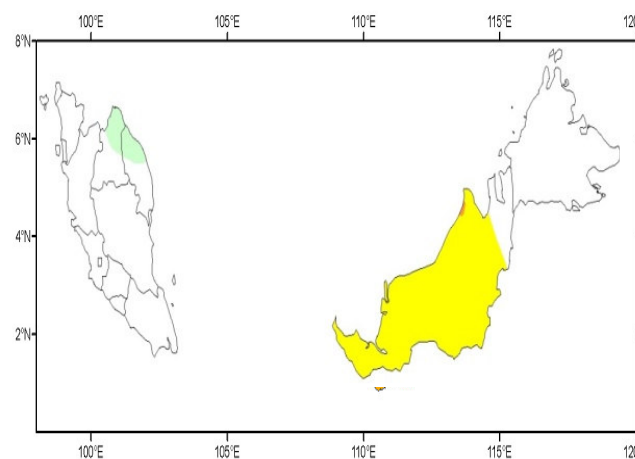
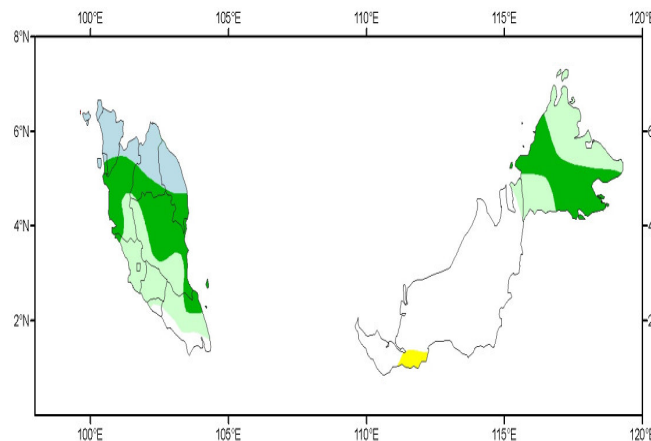
b) April 2012



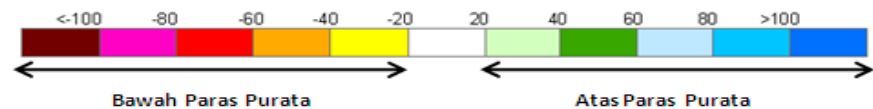
c) Mei 2012



Rainfall Amount

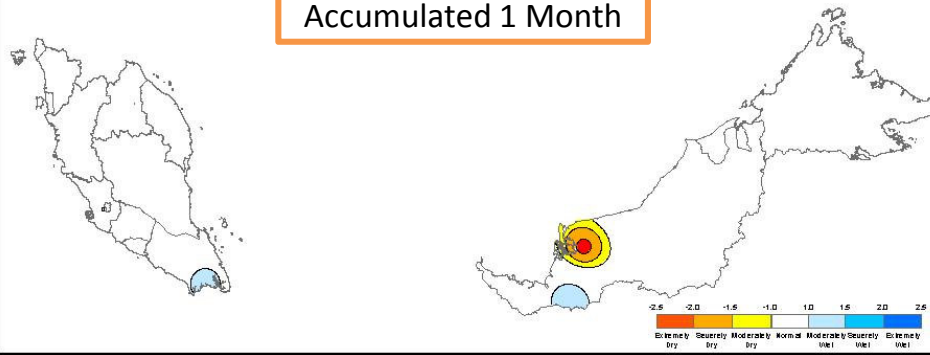


Anomaly Percentage

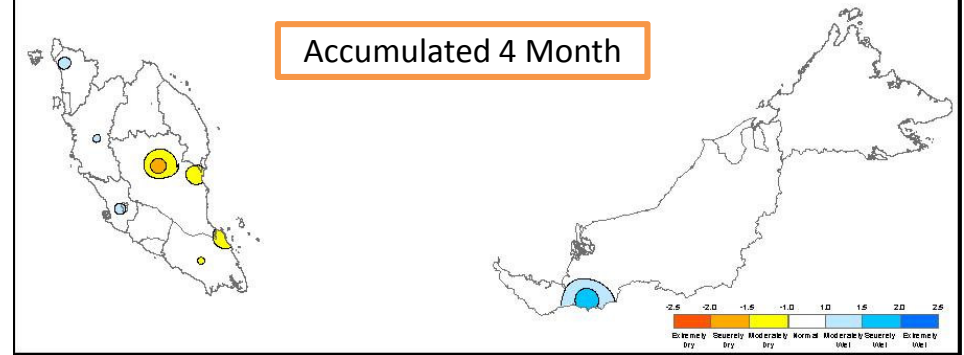


Drought Monitoring -Standardized Precipitation Index (SPI)

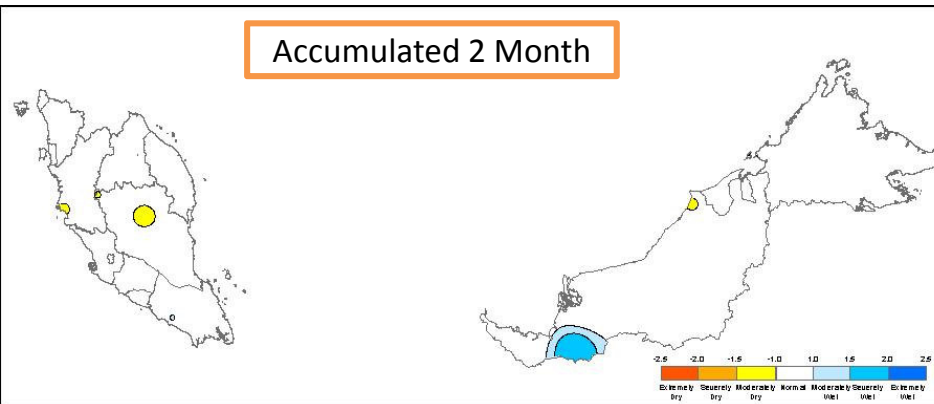
Accumulated 1 Month



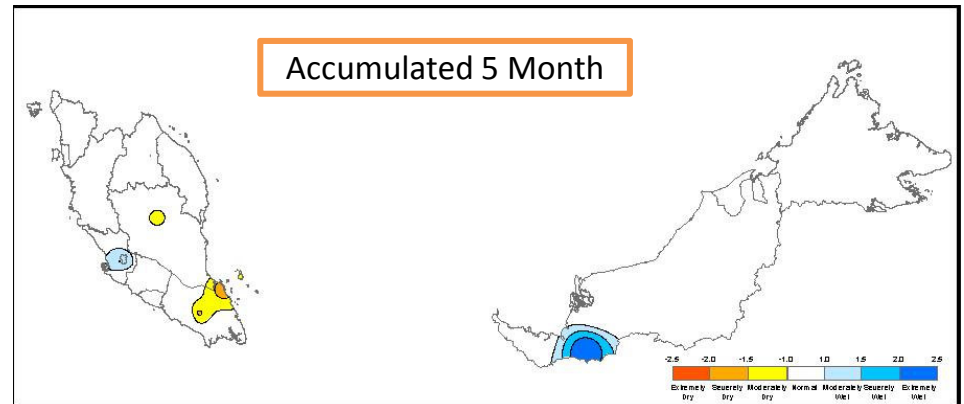
Accumulated 4 Month



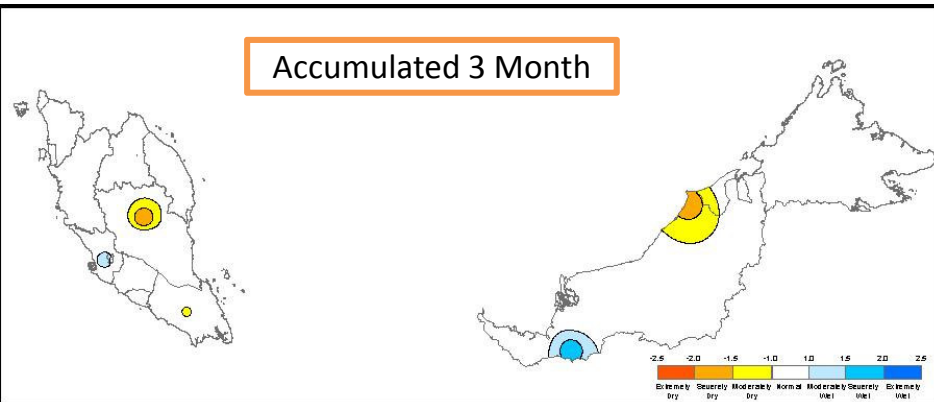
Accumulated 2 Month



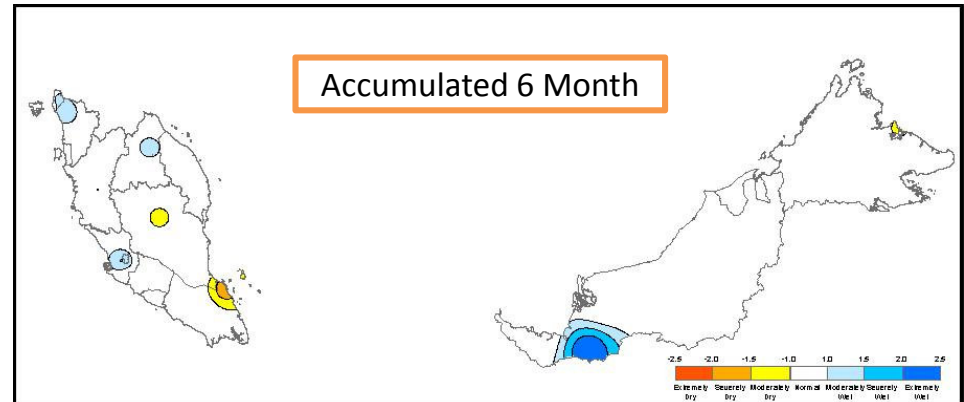
Accumulated 5 Month



Accumulated 3 Month



Accumulated 6 Month



Criteria For DROUGHT ALERT/WARNING

Alert

- a) Total cumulative rainfall for the last 3 months is 65% below the long term average
- b) SPI of the last month is less than -1.5

DROUGHT WARNING

- a) Total cumulative rainfall for the last 3 months is 65% below the long term average AND Total cumulative rainfall for the last 6 months is 65% below the long term average.
- b) SPI of the last month is less than -1.5

- SOP for Drought is follow when this Criteria is fulfill

Advice Issue when:

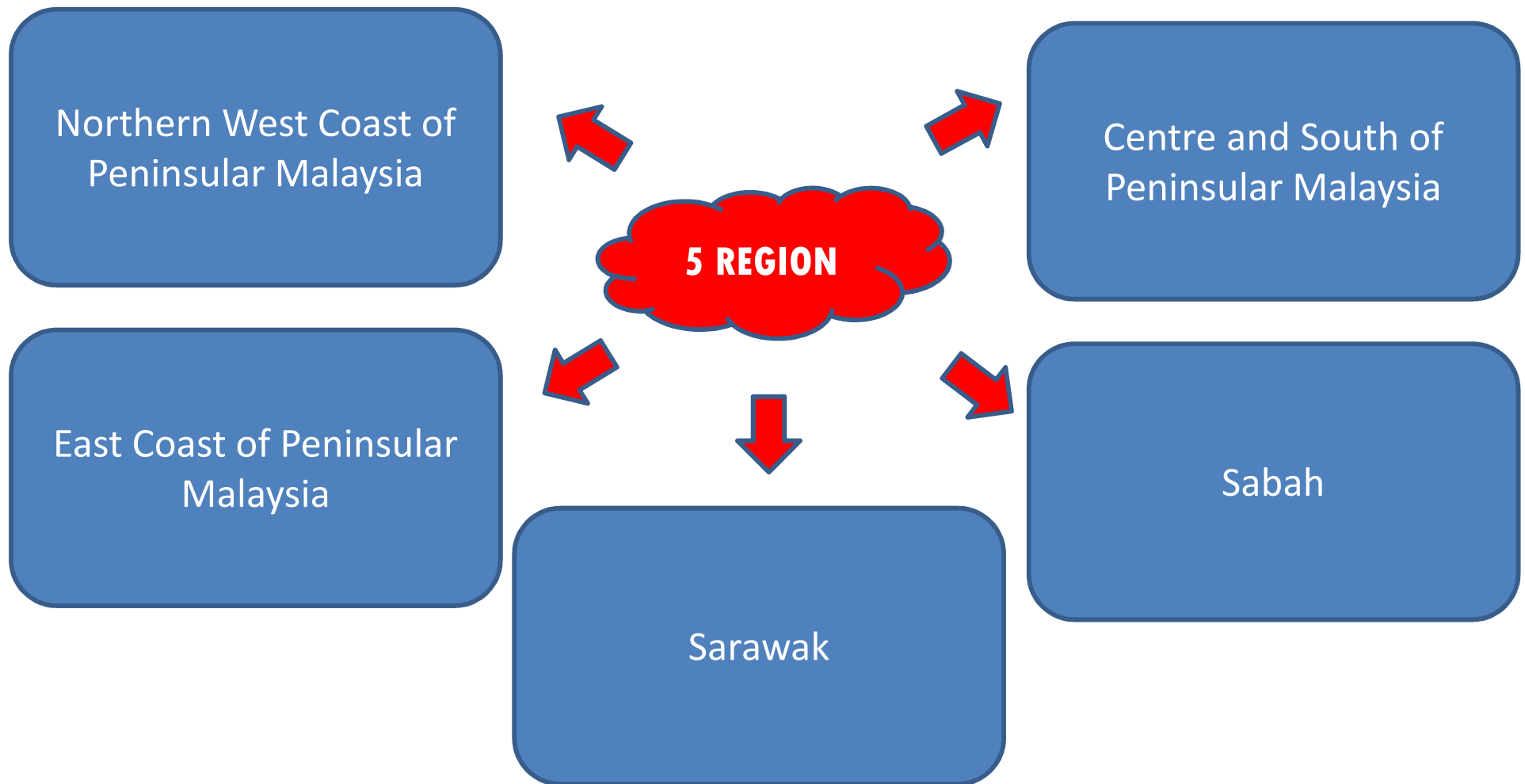
**50% or more stations
over the region recorded
no rain for continuous 5
days !!**



- Email are issue when the criteria comply, update and not comply



Advice on open burning ban

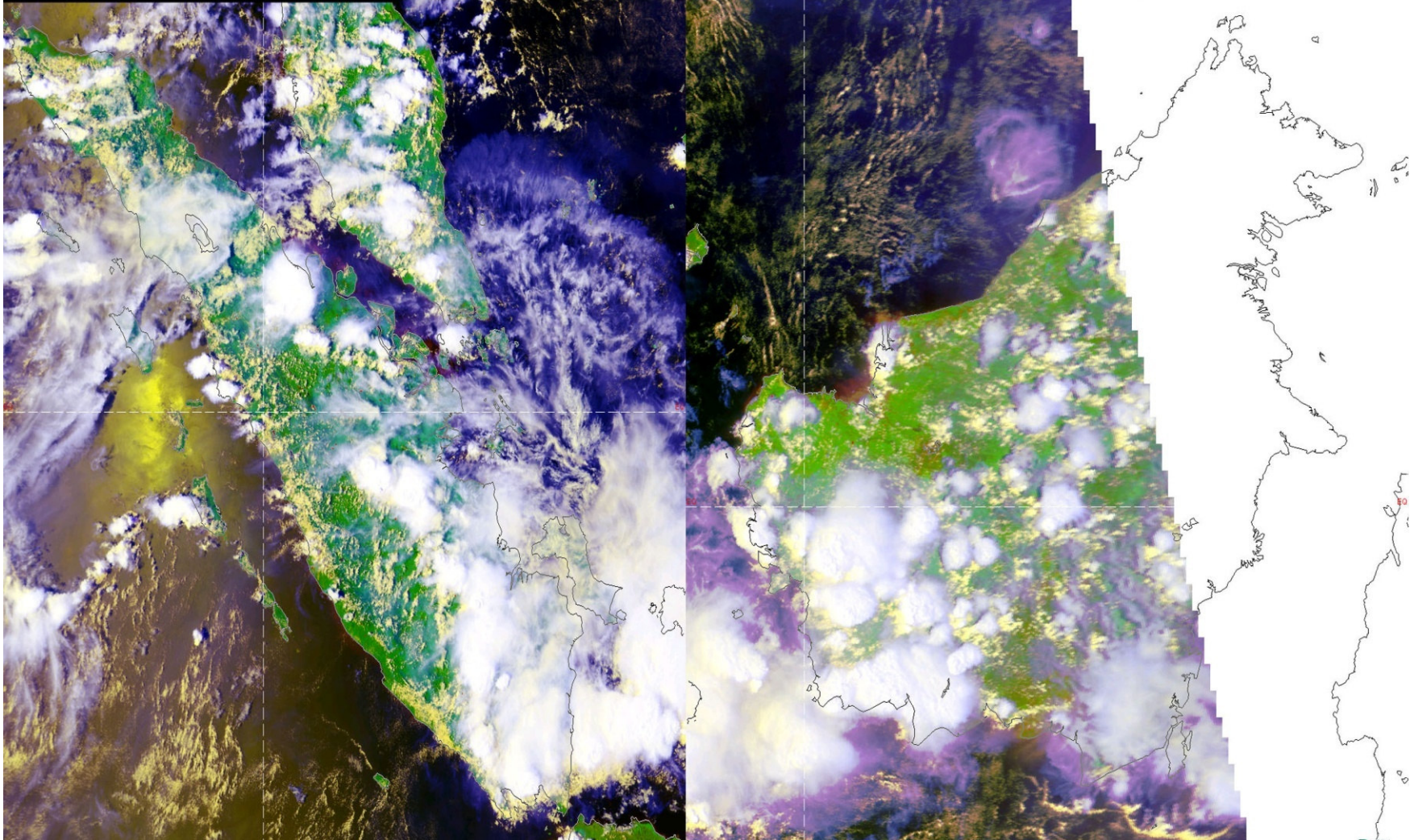


Hot Spot Monitoring

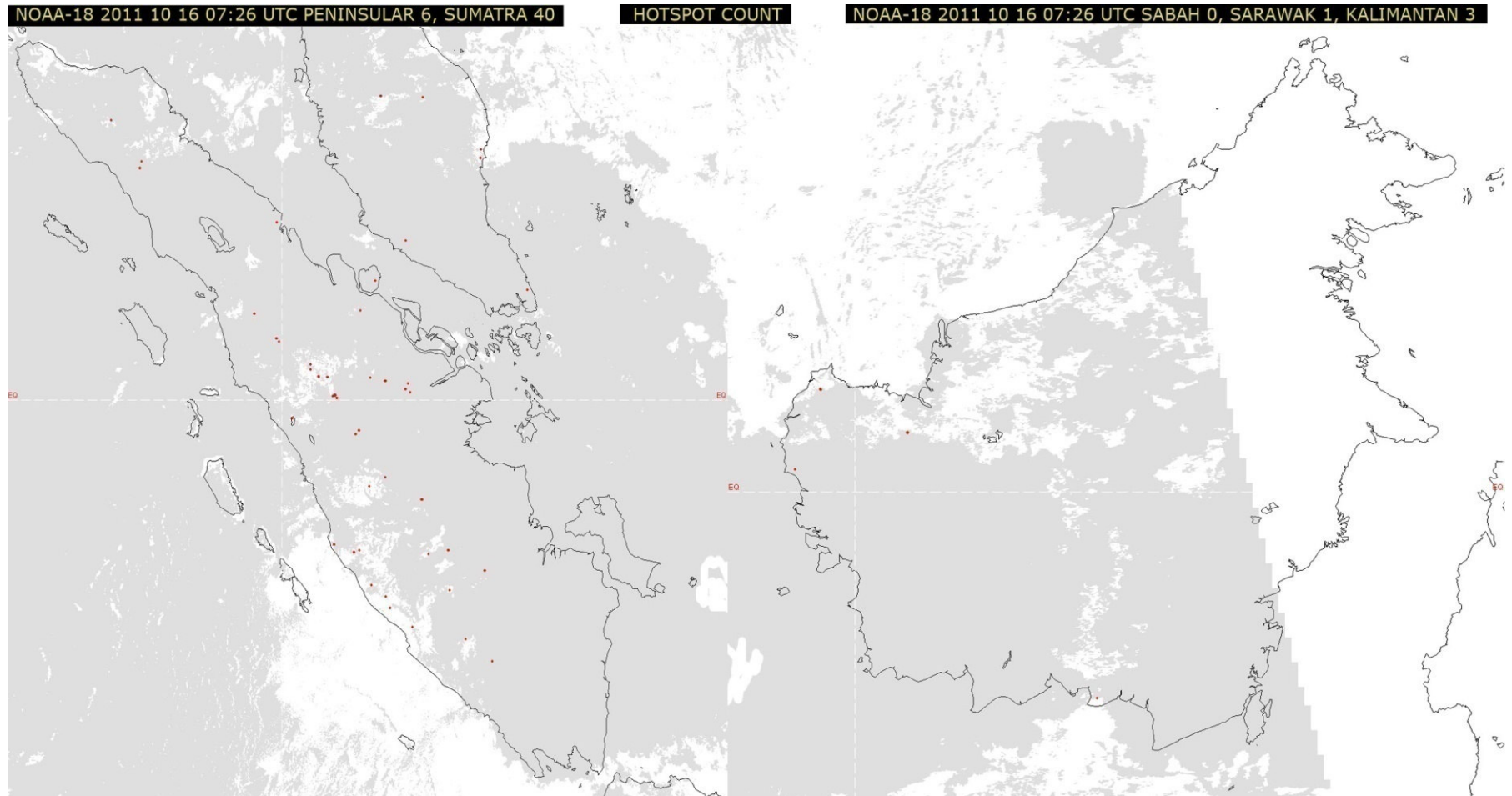
NOAA-18 2011 10 16 07:26 UTC PENINSULAR 6, SUMATRA 40

HOTSPOT COUNT

NOAA-18 2011 10 16 07:26 UTC SABAH 0, SARAWAK 1, KALIMANTAN 3



Hot Spot Monitoring



Daily Report by Environmental Studies Division

During haze condition.

Report on Current Haze Situation Malaysian Meteorological Department (MMD)

Date: 17 October 2011

This daily report which is based on meteorological aspects is prepared for the information of agencies involved in the management of haze issues.

Hot Spots

Based on imageries from the NOAA-18 satellite on 16 October 2011, there were 40 hotspots detected over Sumatra, 3 hotspots detected over Kalimantan and 6 hotspots detected over Peninsular while 1 hotspots detected over Sarawak. There were no hotspots detected over Sabah.

The daily number of hotspots as reported by the ASEAN Specialized Meteorological Centre (ASMC) from NOAA-18 imageries during the period from 12 October 2011 to 16 October 2011 is tabulated below:

Date	No. Of hot spots detected by NOAA-18					
	Time (pm)	Pen. M.sia	Sabah	Sarawak	Sumatra	Kalimantan
12 Oct 11	2:28/4:28	1	3	3	1	46
13 Oct 11	2:20/3:59	0	1	1	21	33
14 Oct 11	2:08/3:48	2	6	0	38	23
15 Oct 11	2:00/3:37	4	1	1	125	6
16 Oct 11	3:26	6	0	1	40	3

Wet weather conditions continued to help subdue the hotspot activities in ASEAN region. Isolated hotspots were detected mainly in Sumatra, Java and Sulawesi.

Based on the surveillance report by BOMBA yesterday, there were a total of 26 small burnings throughout the country with 7 small burnings each in Selangor and Johor, 6 small burning in Perak, 4 small burning in Sabah while 1 small burning each in Terengganu and Sarawak.

The API readings reported by the Department of Environment (DOE) at 7.00 am this morning shows that 84% of the areas have good API status (API below 50) and 16% with moderate status (API between 51-100). The highest API level in the country was 60 reported in Bukit Rambai, Melaka followed by Tanah Merah, Kelantan (58), Relabuhan Kelang (57) while Kemaman, Terengganu reported API of 54.

Visibility

As at 11:00 am, in Peninsular Malaysia, meteorological stations of Prai, Bayan Lepas and Butterworth reported visibility of 7 km to 8 in fair weather. Others meteorological stations in Peninsular reported visibility of more than 10 km in fair weather.

For Sabah and Sarawak, all of the meteorological stations reported visibility of more than 10 km in fair weather.

Wind

In Northern Peninsular, the wind is blowing mainly from the north while in Southern Peninsular, the wind is blowing mainly from the east with wind speed between 10 to 20 kmph.

For Sabah and Sarawak, the wind is blowing mainly from the northeast with wind speed between 10 to 20 kmph.

Fire Danger Rating

Fine Fuel Moisture Code (FFMC) as reported on 16 October 2011

The FFMC indicates the relative ease of ignition and flammability of fine fuels.

In Peninsular Malaysia, the FFMC is generally in low to high category except for certain areas over Pahang and Johor which is in extreme category.

The FFMC in Sabah is generally in moderate to extreme category. In Sarawak, the FFMC is generally in extreme category.

In Sumatra, the FFMC is generally in low to high category except for certain areas over Riau, Pekanbaru South Sumatra and Lampung provinces which are in extreme category.

In Kalimantan, the FFMC is generally in low to high category except for certain areas over Central, East and South Kalimantan which are in extreme category.

Drought Code (DC) as reported on 16 October 2011

The DC values indicate the difficulty in extinguishing deep burning peat fires as well as an early warning indicator of serious haze events.

In Peninsular, Sabah and Sarawak, the DC is generally in low category.

In Sumatra, the DC is generally in low to moderate category except for certain areas over South Sumatra and Lampung provinces which are in high to extreme category.

In Kalimantan, the DC is generally in low to moderate category.

Fire Weather Index (FWI) as reported on 16 October 2011

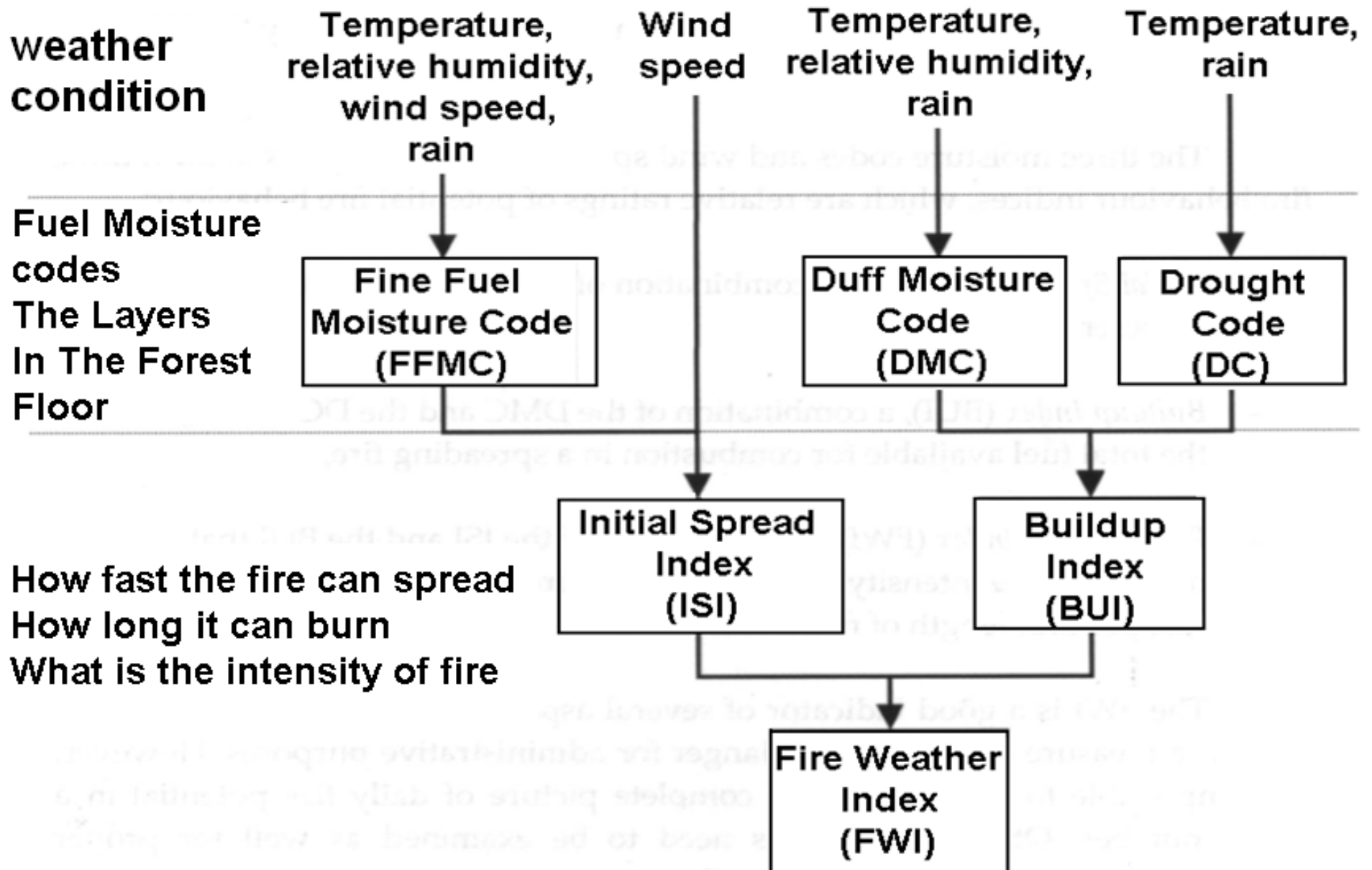
The FWI values indicate the difficulty of fire control based on the head fire intensity and fire fighting capability.

History of FDRS

FDRS In METMalaysia

- **Fire Danger Rating System for Malaysia is computed and displayed on MMD website since 2003**
- **Also for Southeast Asia**
- **Based on the Canada Forestry Service (CFS) through CIDA**

THE CANADIAN FOREST FIRE INDEX SYSTEM



- **12th Informal ASEAN Ministerial Meeting on the Environment : 6th Meeting of the Conference of the Parties to the ASEAN Agreement on Transboundary Haze Pollution (October 2010 Brunei Darul Salam) endorsed the Development of FDRS for the ASEAN Region**
- **To Refine FDRS**

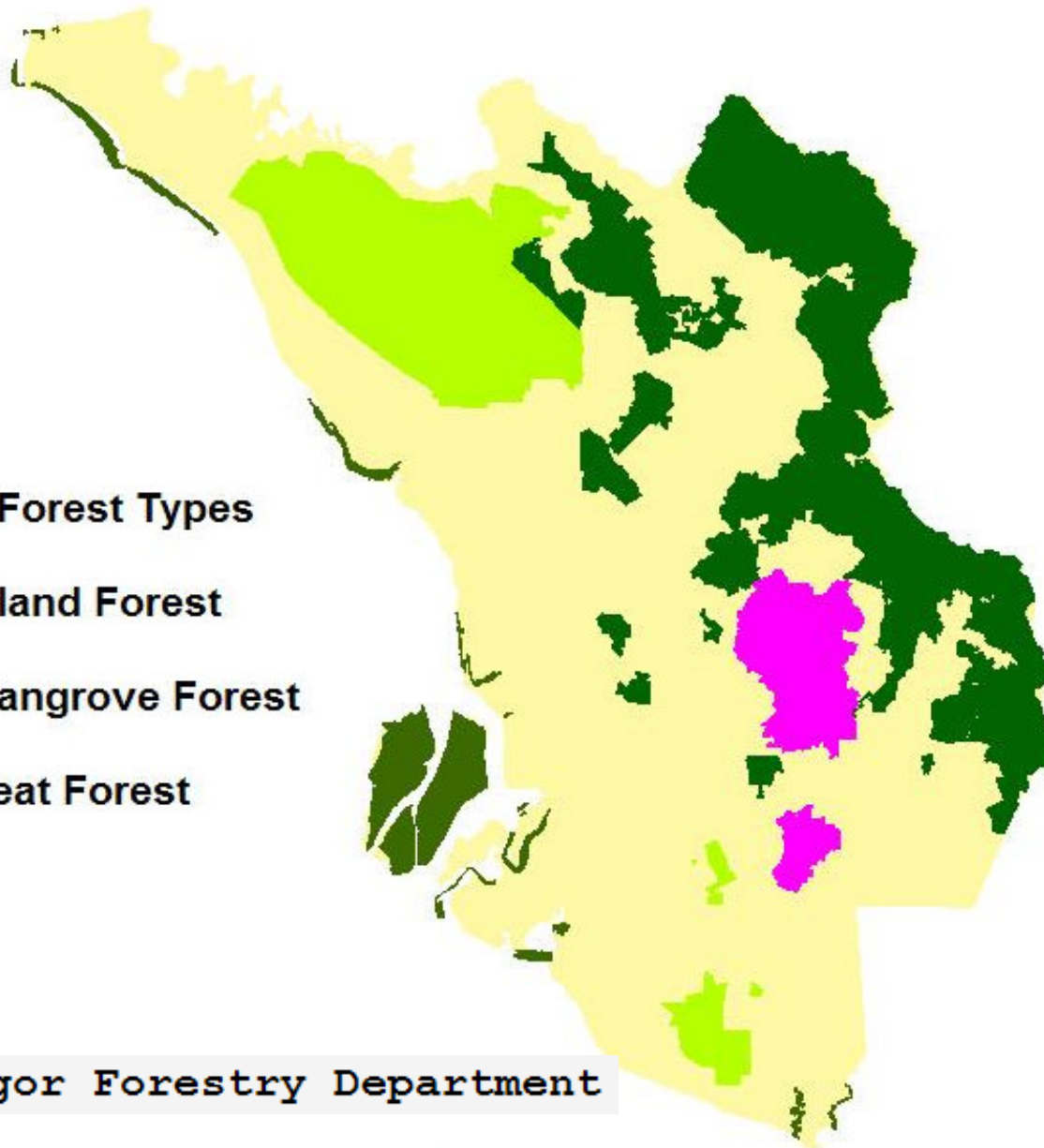
FDRS Pilot Refinement Project in State of Selangor, Malaysia

FDRS Pilot Project Over Peatland Area.

Peat Forest in Selangor

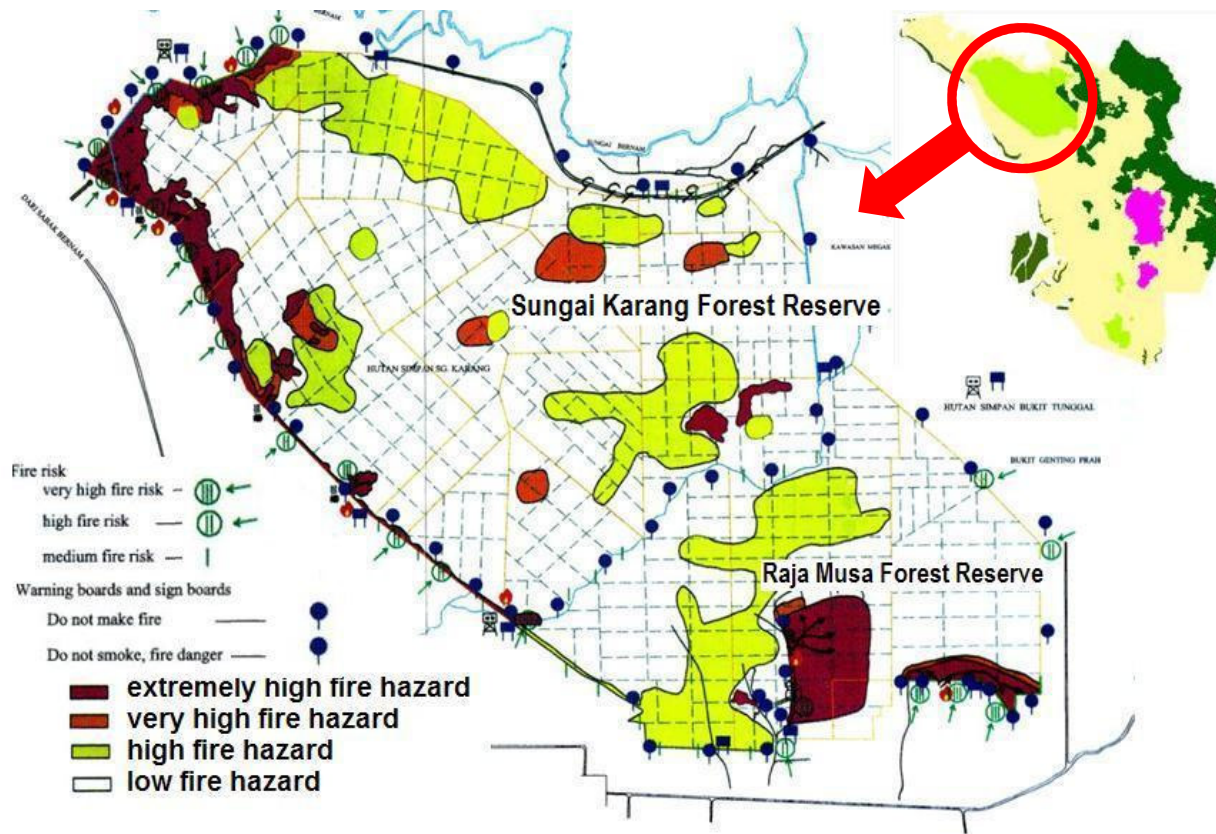
Main Forest Types

- Inland Forest
- Mangrove Forest
- Peat Forest



Pilot Project the State of Selangor

The North Selangor Peat Forest Reserve Fire Prone Area



VERIFICATION OF FDRS CODES

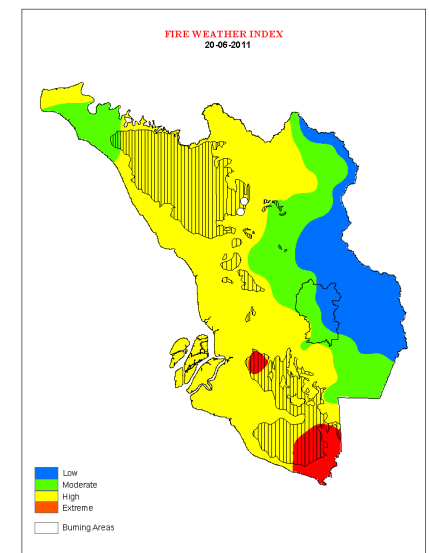
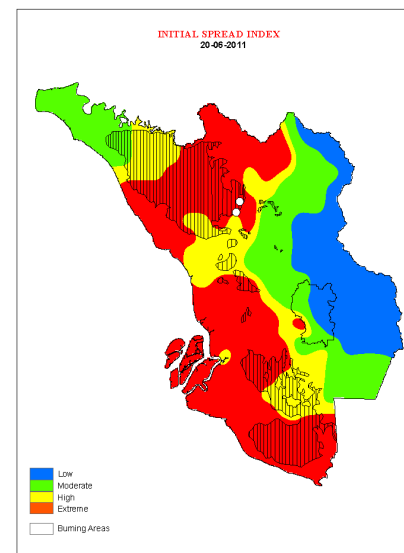
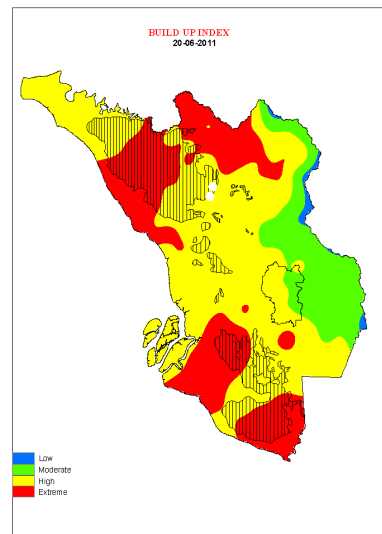
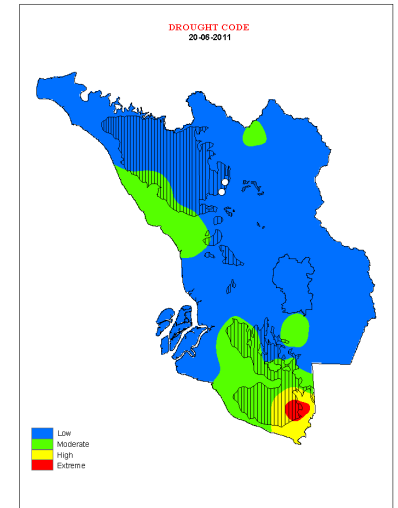
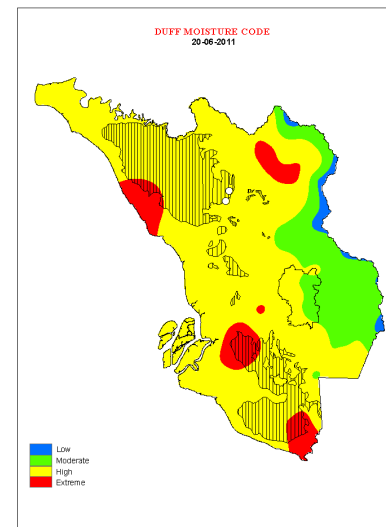
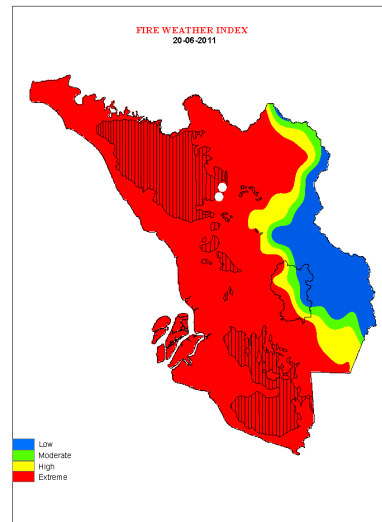
- Coordinated By NRE
- Observations/Ground truth By DOE, JPSM & GEC
- Phase 1 - Verification was carried out from 15 June 2011 to 31 July 2011
- Phase 2 - Verification in progress from 1 August 2011 to 30 September 2011

Pilot Project the State of Selangor

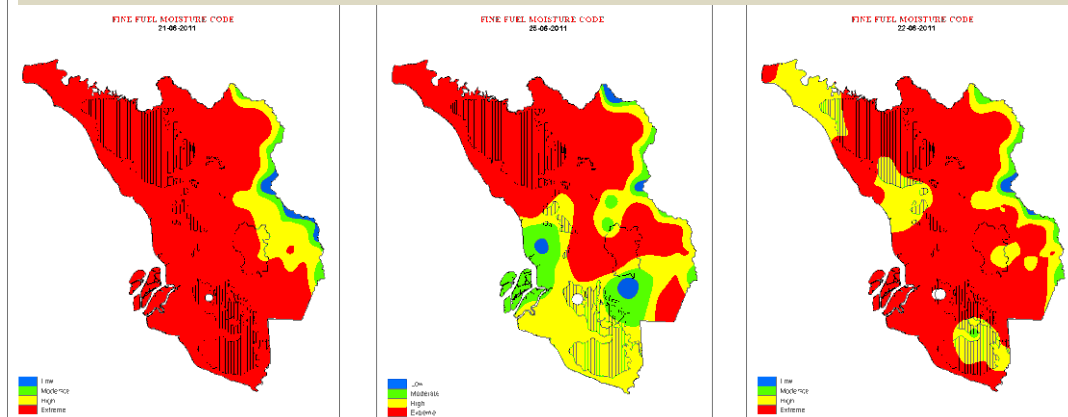
Burning in Parit 4 dan Parit 5, Raja Musa Forest Reserve on 20/6/2011 for FFMC, DMC, DC, ISI and FWI.

Based observation on 20 Jun 2011:

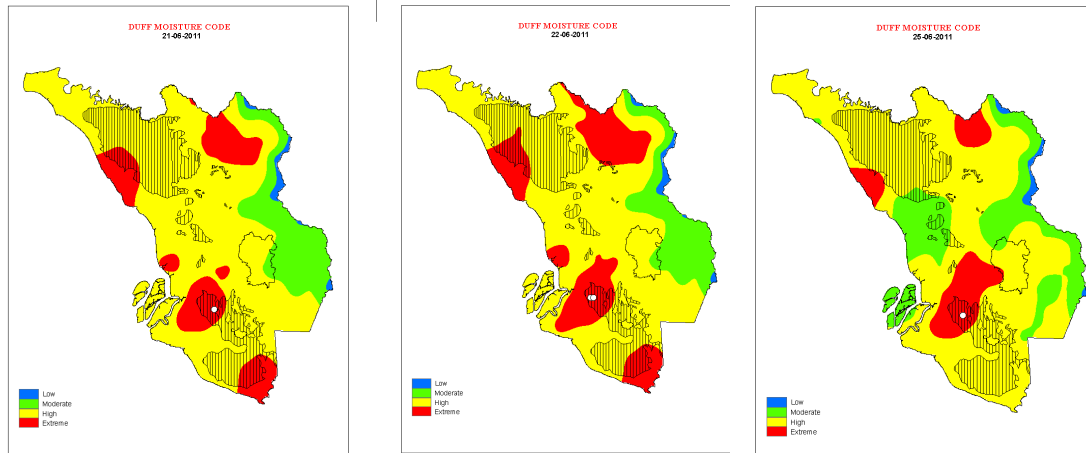
reflect with actual situation where most places show all FDRS indices are in high category with high probability to ignite fire except for DC Typical wet-season conditions and severe haze periods are unlikely. More than 30 dry days until DC reaches threshold at which point severe haze is highly likely



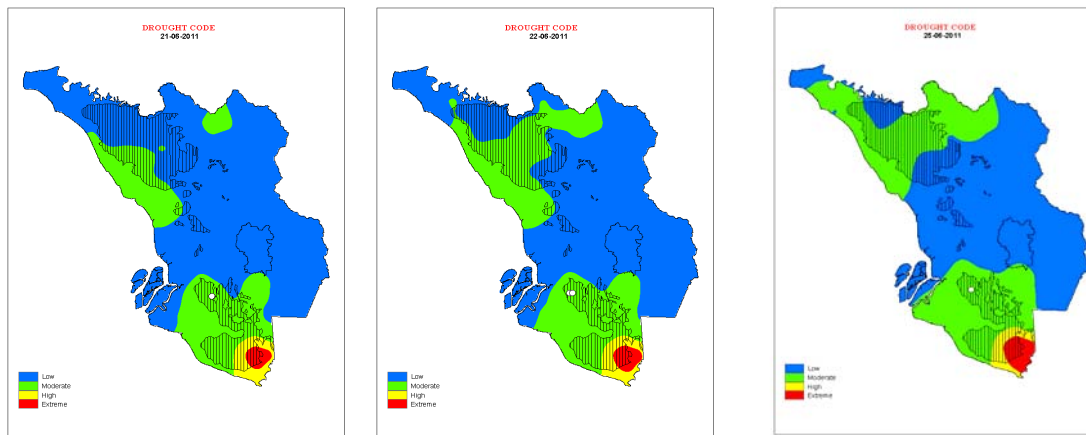
Pilot Project the State of Selangor



**FFMC : Burning Was Observed
in Johan Setia On 21/6/2011,
22/6/2011 and 25/6/2011**



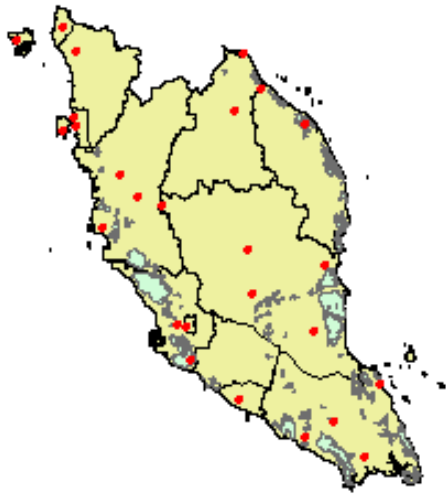
**DMC For 21/6/2011,
22/6/2011 dan 25/6/2011**



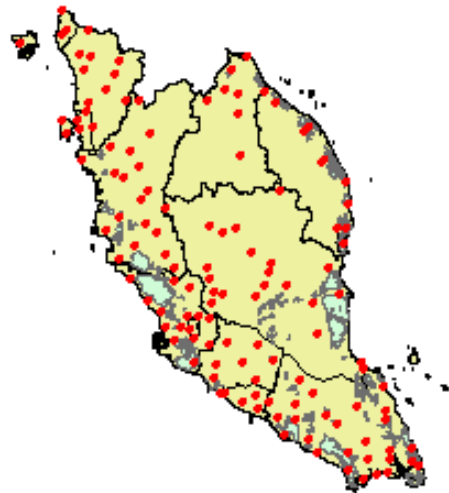
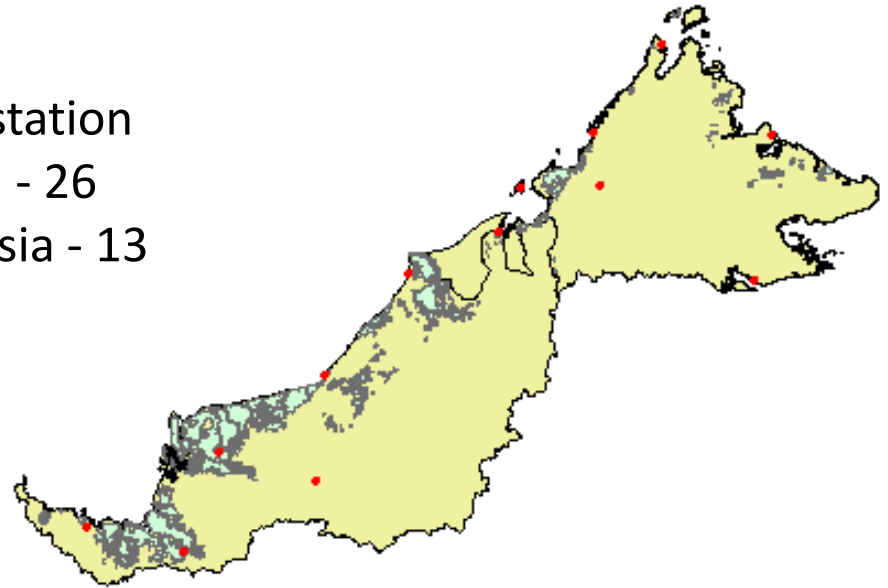
**DC on 21/6/2011, 22/6/2011 and
25/6/2011**

Current Products and Applications of FDRS

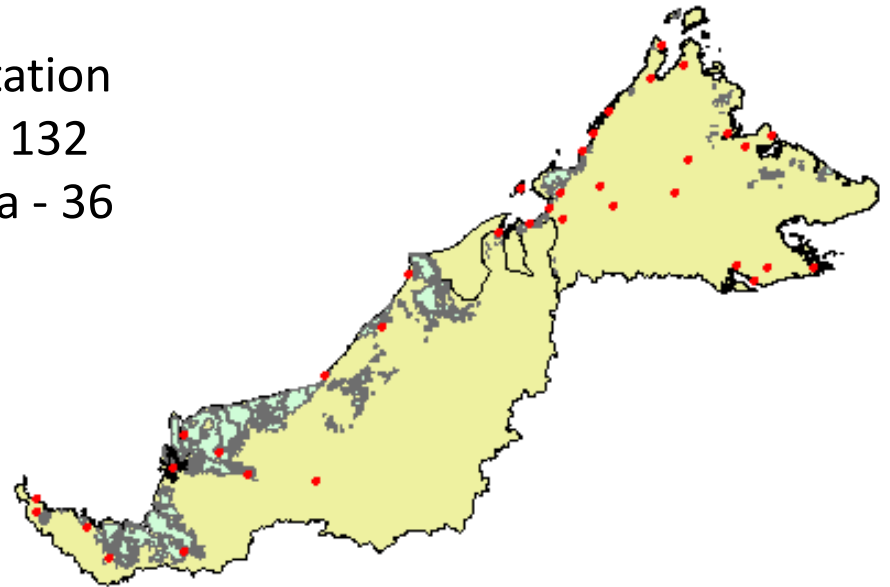
Increase station number from 39 to 168



39 station
Peninsular - 26
East Malaysia - 13



168 station
Peninsular - 132
East Malaysia - 36

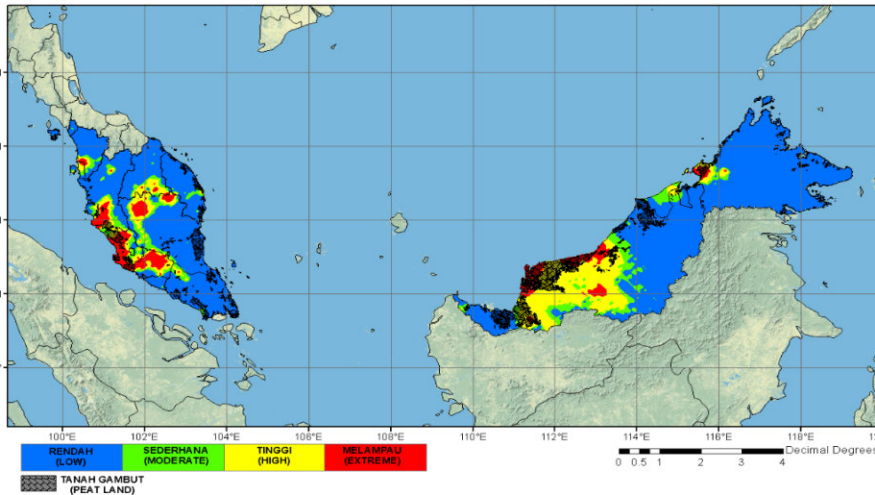


<http://www.met.gov.my/fdrs/>



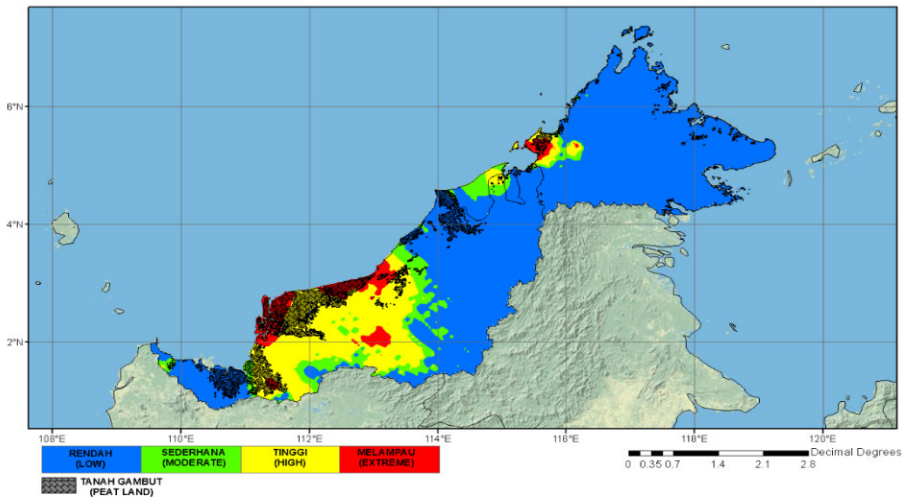
KOD KELEMBAPAN BAHAN HALUS FINE FUEL MOISTURE CODE (FFMC)

06-03-2012



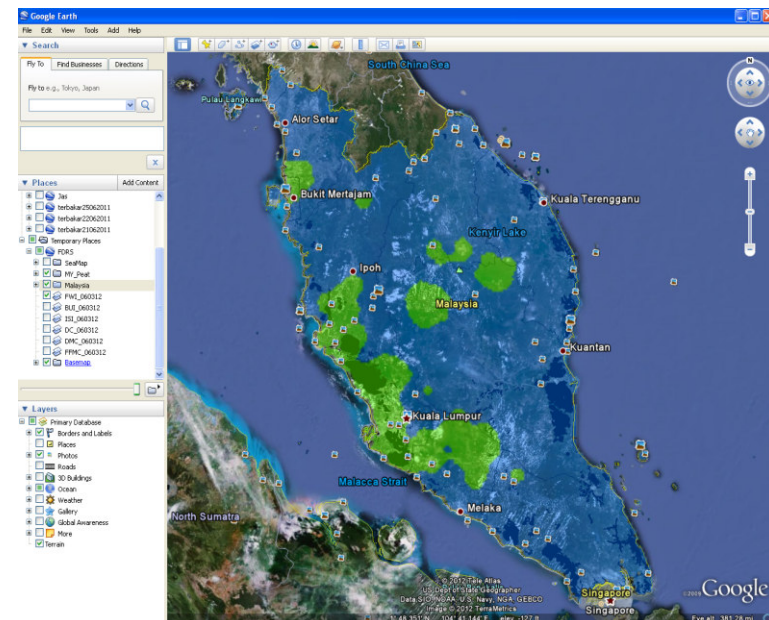
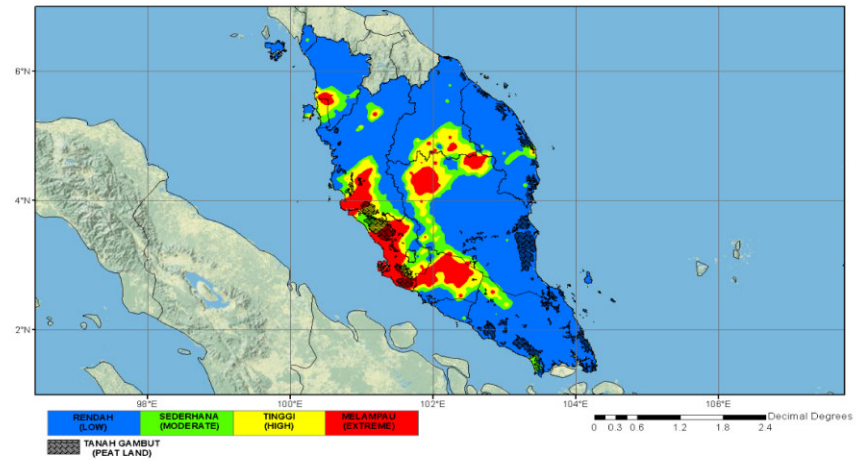
KOD KELEMBAPAN BAHAN HALUS FINE FUEL MOISTURE CODE (FFMC)

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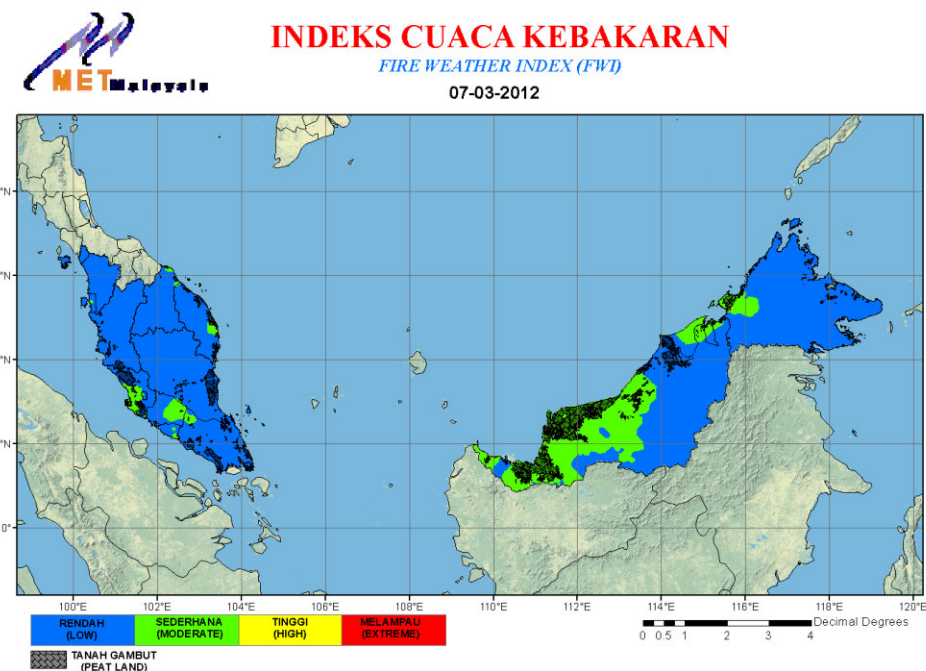
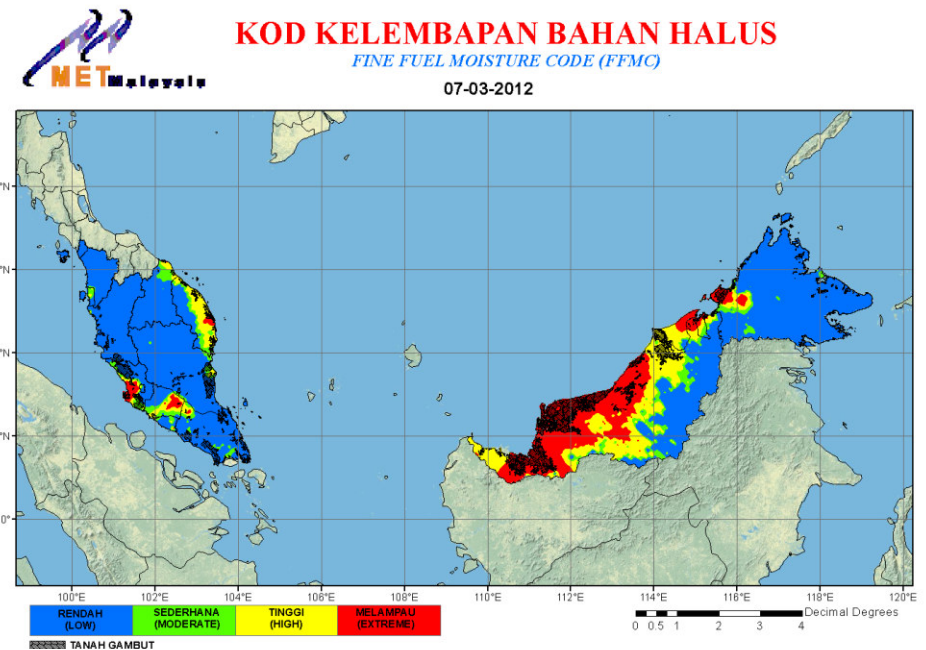
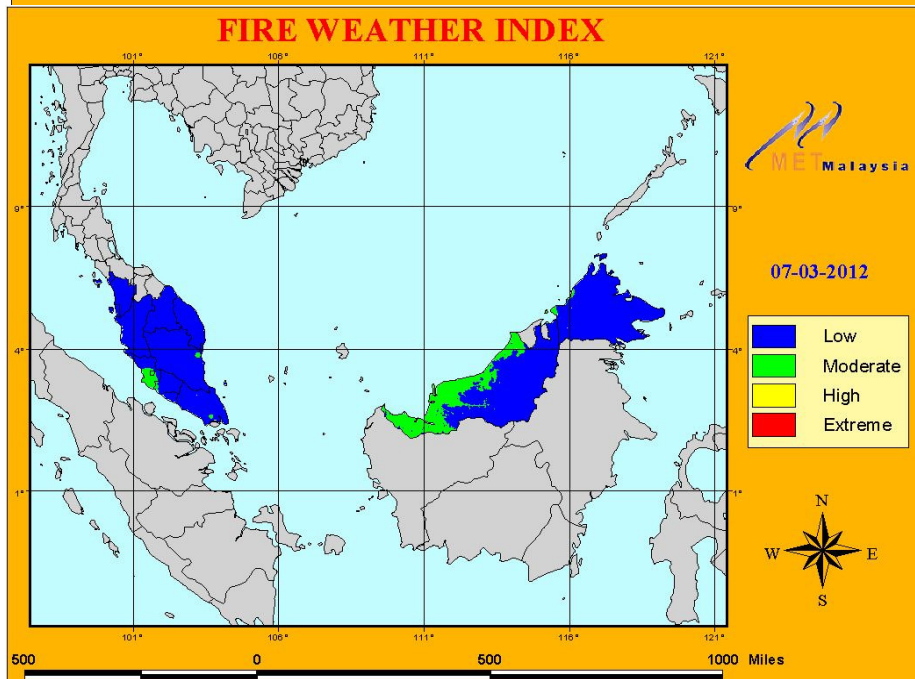
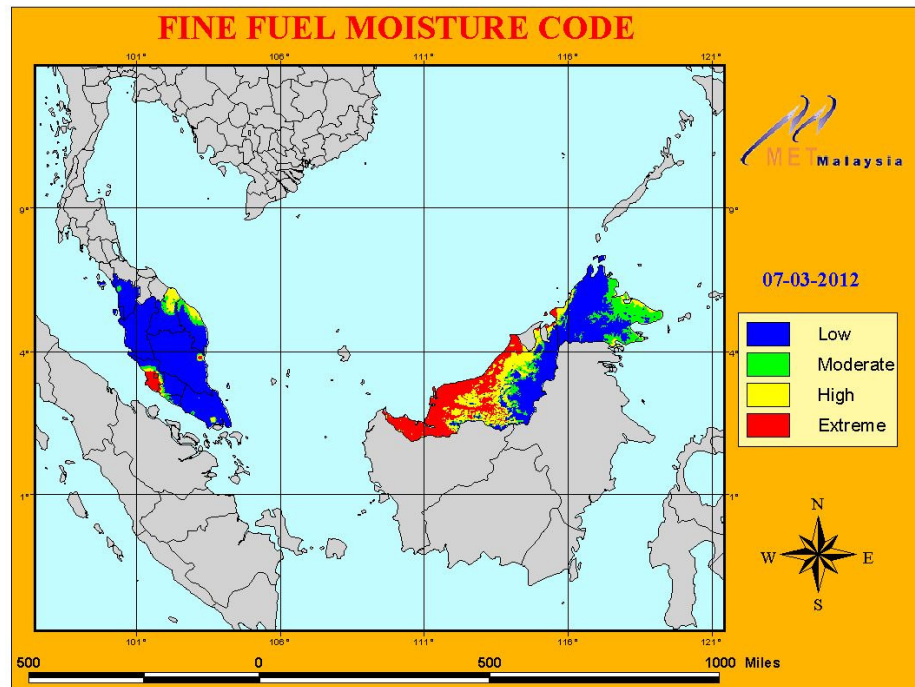
KOD KELEMBAPAN BAHAN HALUS FINE FUEL MOISTURE CODE (FFMC)

06-03-2012



- Zoom to Peninsular & East Malaysia
- Google Map
- Peatland area

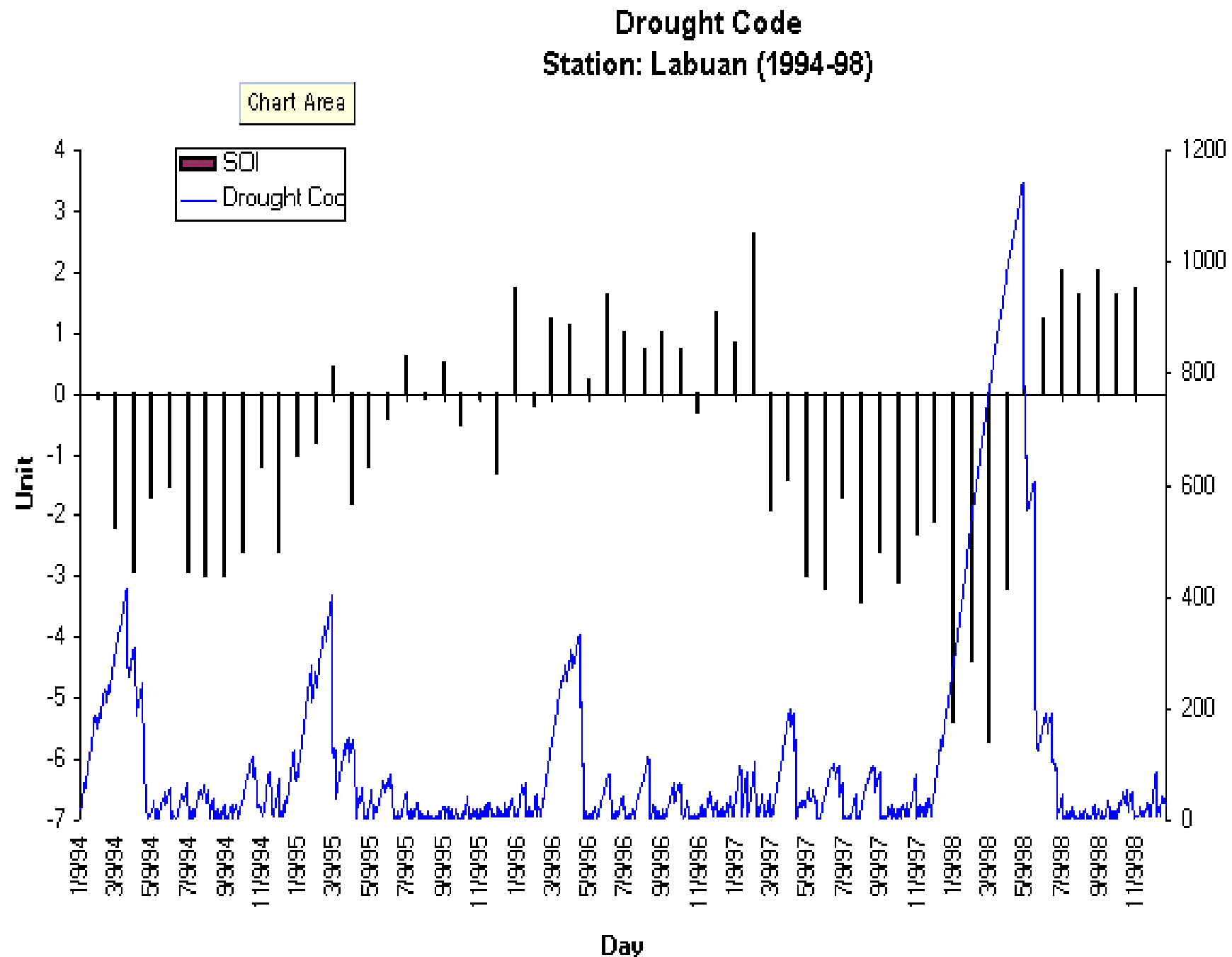
Differences between the old and new Malaysian FDRS



Different between old and new Malaysian FDRS

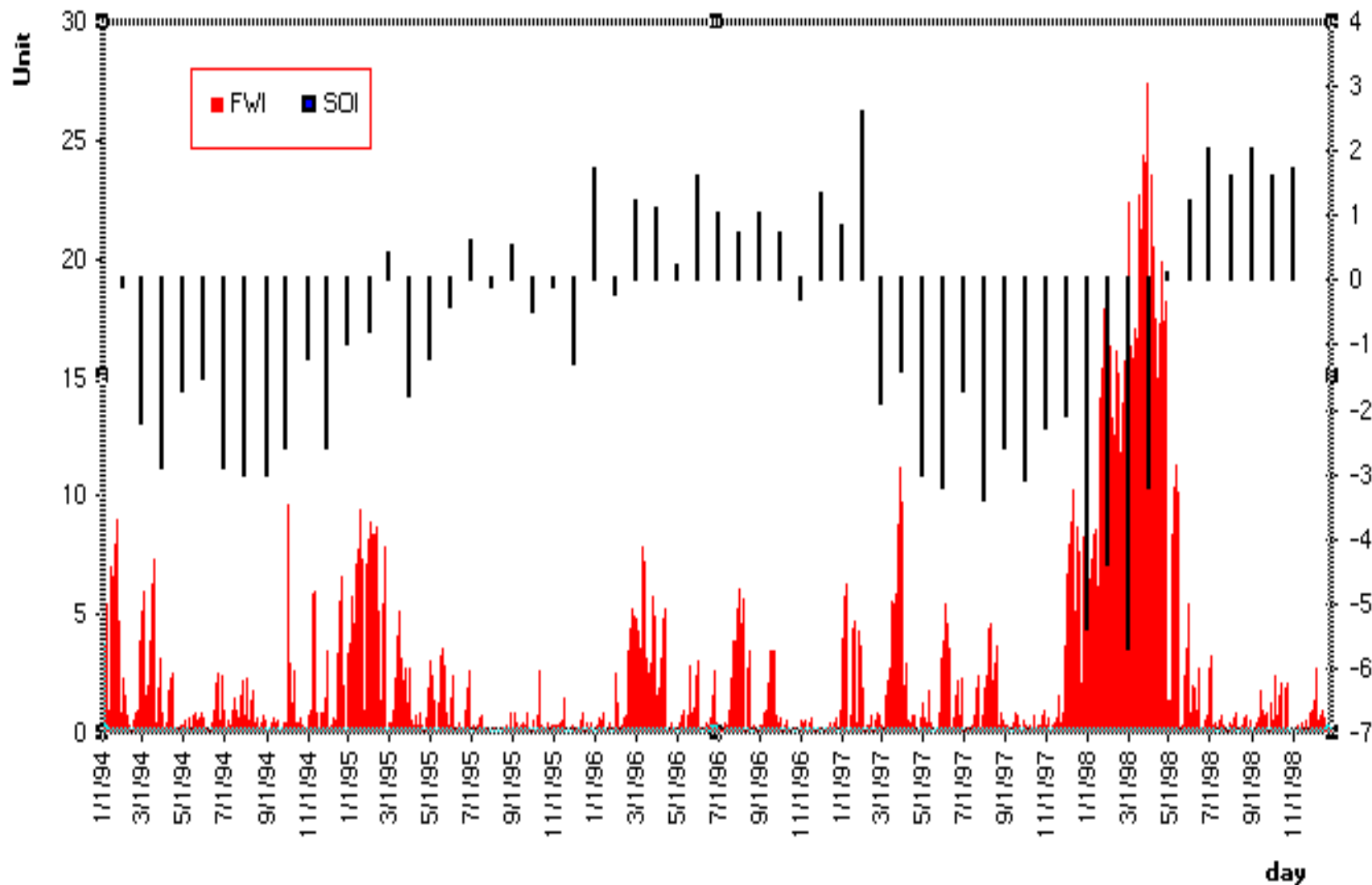
- Better resolution
- Refinement of initial data from 37 principal station to all 168 weather station
- FDRS product now are more detail and accurate.

Analyses done on some of the FDRS products



Analyses done on some of the FDRS products

The Fire Weather Index (FWI)
Station: Labuan 1994-98



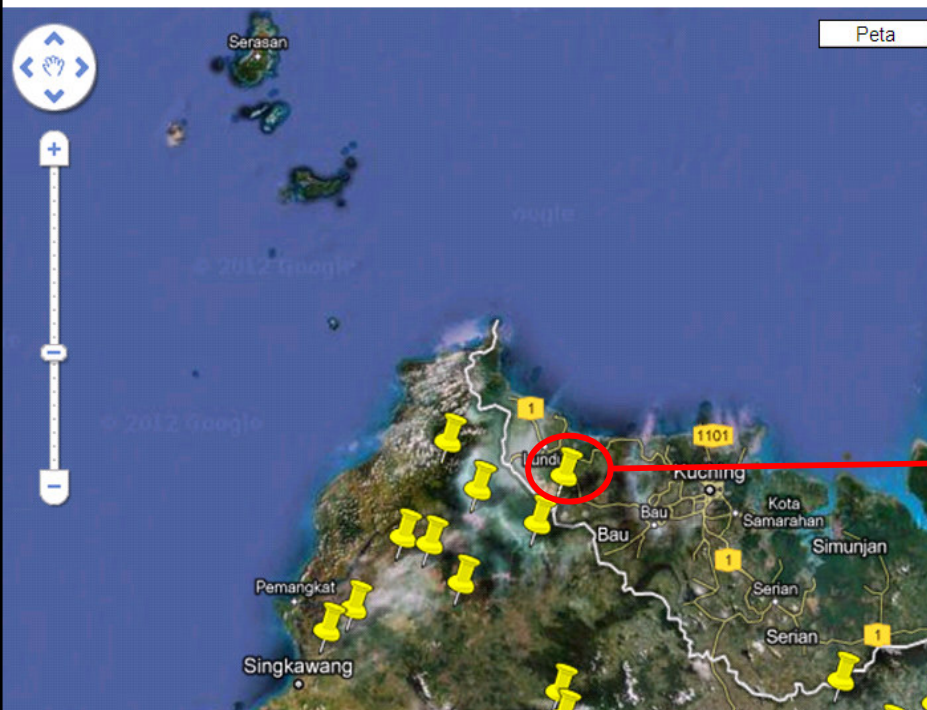
Effort work towards refinement of FDRS

Malaysian Meteorological
Department & Department of
Environment, Malaysia

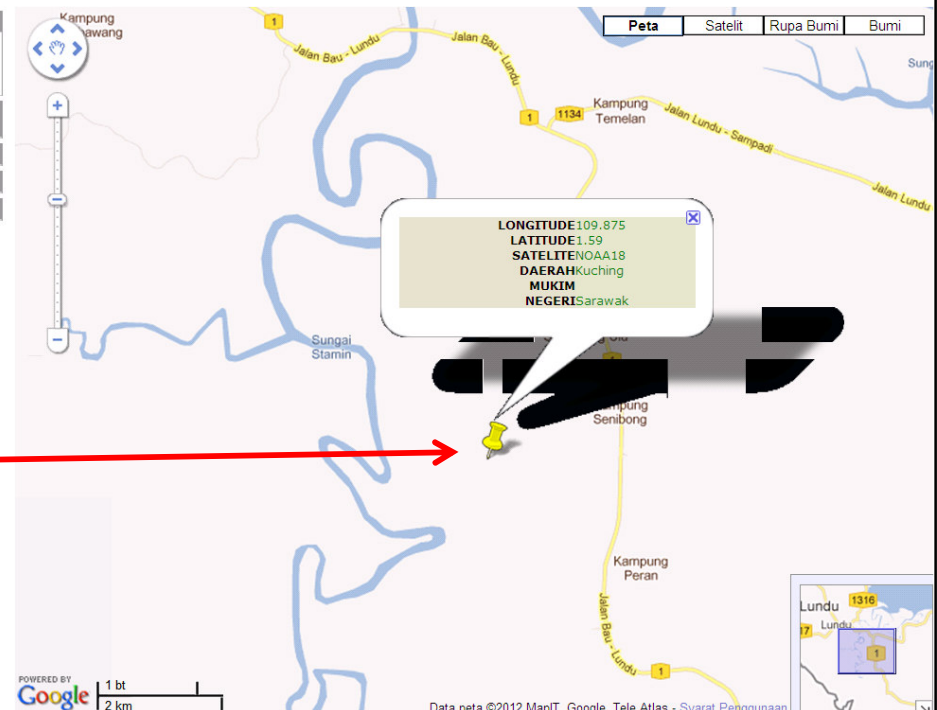
Applications of FDRS

- DOE use FDRS as early warning system in order to take appropriate action on the ground to curb land and peat fires that cause deterioration of air quality with particular attention during hot and dry weather

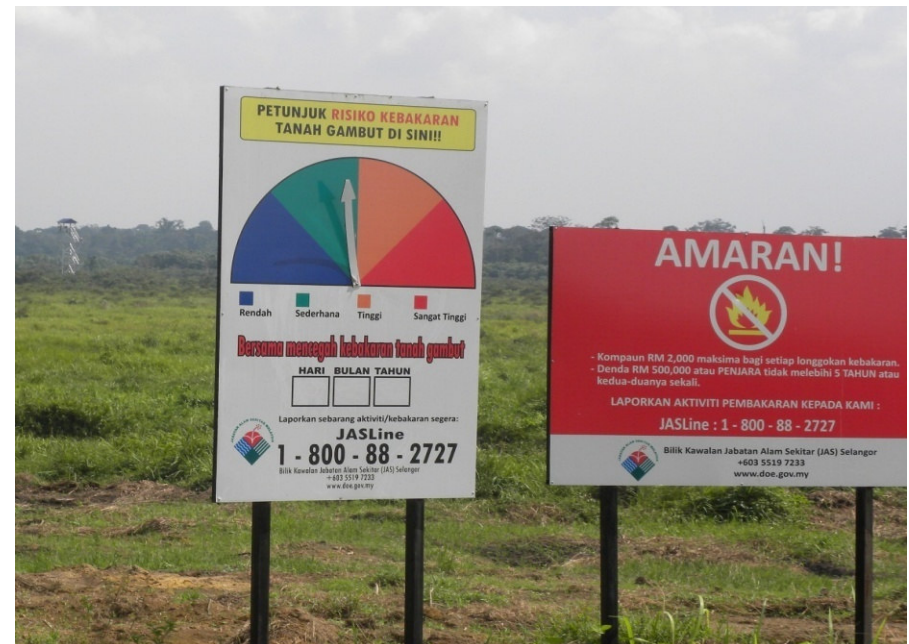
SATELLITE IMAGE



MAPPING AND COORDINATES



- Verification of fire incidence was done :
 - By having hotspot map superimpose to google map and having GIS system to indicate the spesific location of hotspots;
 - Ground truthing is done by sending enforcement officers from DOE/local authorities patrolling the potential fire risk areas.



- Engage local community such (English) RELA to monitor the fire prone area - fire suppression by engaging BOMBA/DID/MGD to ready with structures to mitigate fire breakout



- Use of FDRS as an alert system to the enforcement officer to monitor the area of concern such as peatland, forest, plantation area, waste disposal area and shrubs.

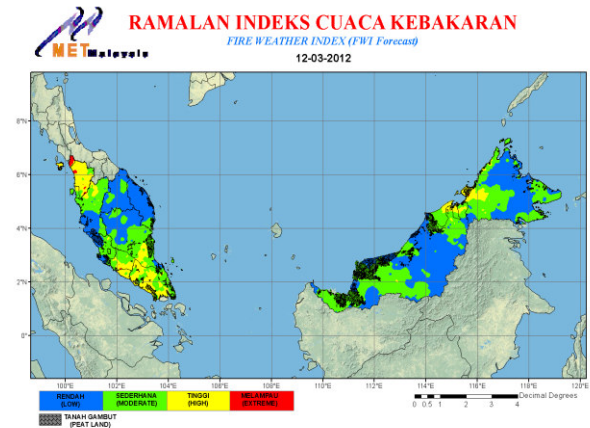
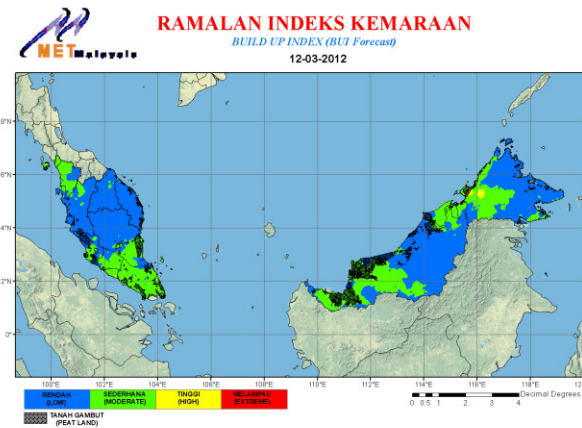
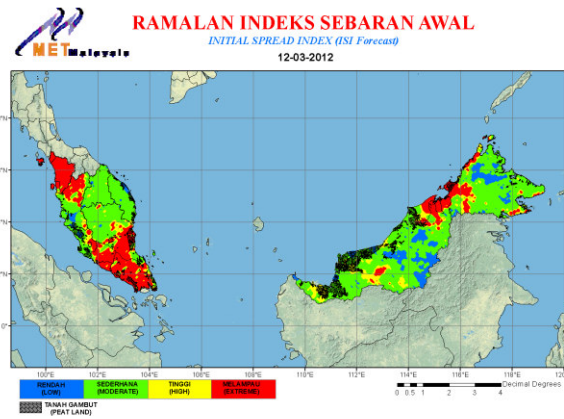
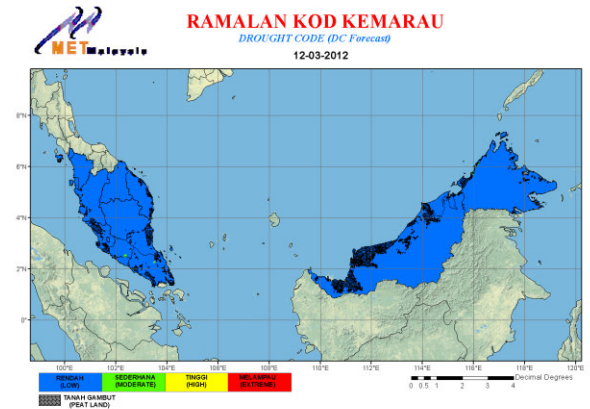
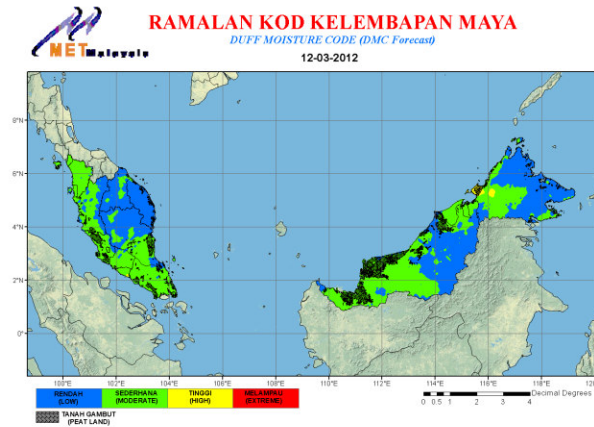
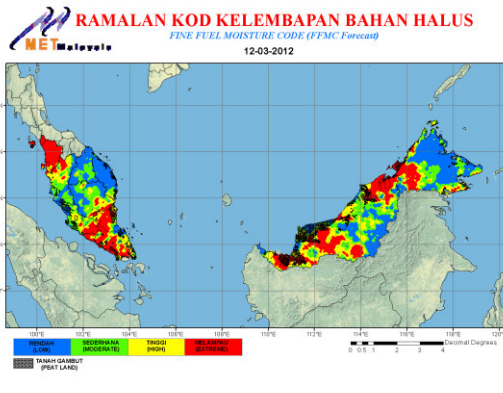


Future Plan for FDRS

Future Plan for FDRS

- Using NWP data to produce FDRS forecast maps
- Software Update
- Increase the number of the weather stations
- Redefine fire danger (severity) code

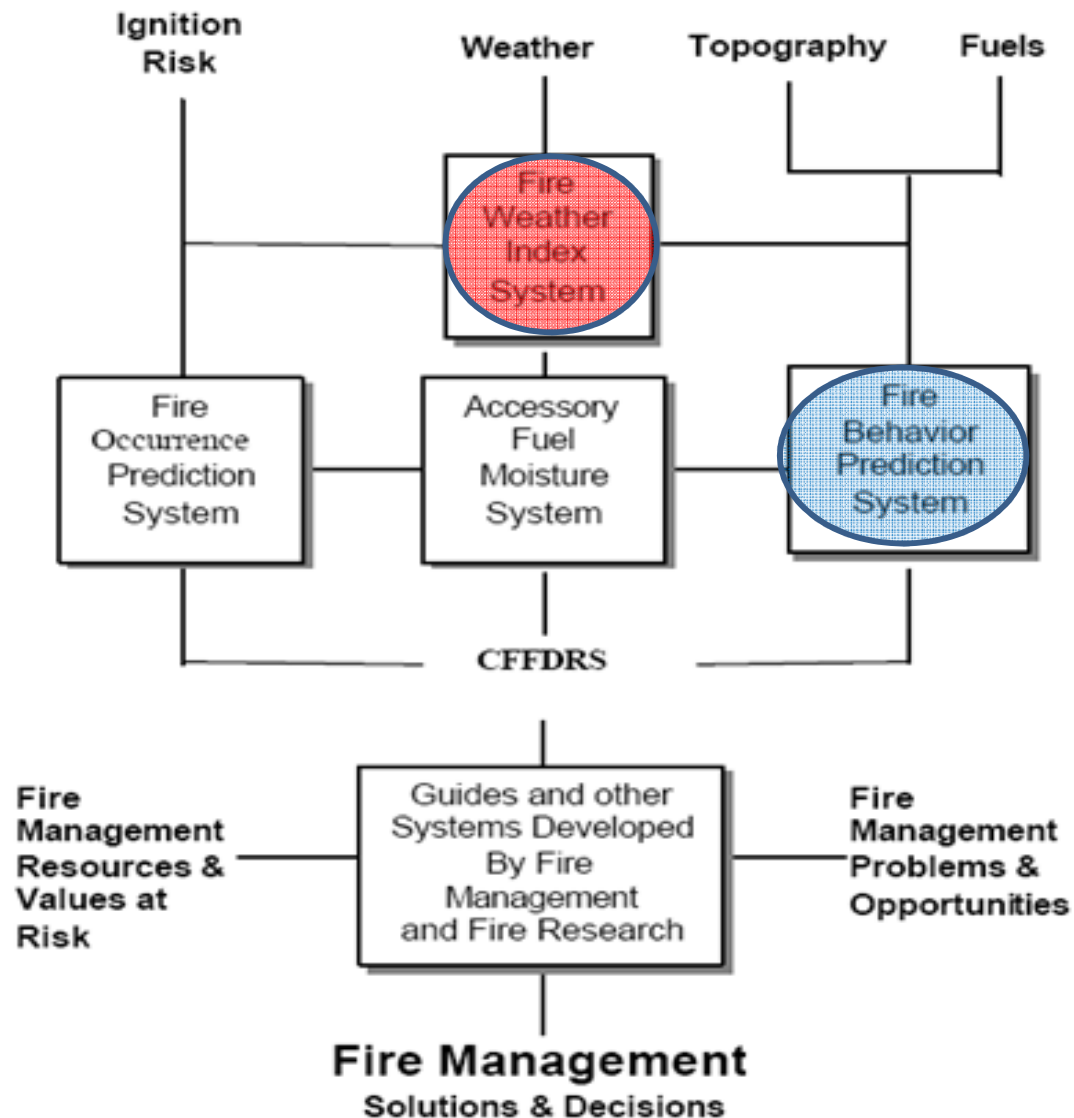
FDRS Forecast Product



- Still in the development stage
- Need verification

ABSTRACT OF CANADIAN FORESTRY FDRS SOFTWARE

Canadian Forest Fire Danger Rating System (CFFDRS)



- Currently FWI only
- Future Plan, FBPS

Collaboration of MMD and DOE



- Installation of a new Automatic Weather Station (AWS) in peatland area.
- Future Plan, minimum one AWS for each district .

Thank You