


Forest Monitoring From The Sky

Monitoring Forest Using Remote Sensing

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Forest Monitoring From The Sky

Introduction

Application of remote sensing GIS for forestry application at FDPM started in 1986 but mostly were case studies at specific areas.

Satellite imageries were used to help stratifying the forest for the third NFI(1990-92). For the fourth NFI (2000-02), they were further used to determine forested areas.



In 1998 onwards, they were used to determine forest change, forest encroachment and illegal logging, but at less real-time.

In 2006, more real-time imageries were used. Boundaries were corrected using hyperspatial resolution. Meanwhile, hyperspectral imageries were at experimental stage to estimate tree species and volume.

In 2006, forest encroachment monitoring, planned at every 1 month (*for sensitive PRF*) and 6 months (*for less sensitive PRF*). While monitoring logging activities were planned every 1-2 weeks (*for sensitive area*) and 3-4 weeks (*for less sensitive areas*)

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- Remote Sensing technology can be applied using plane or satellite

<h3 style="text-align: center;">Satellite</h3> <p style="text-align: center;"><i>Cheap & easy)</i></p> 	<h3 style="text-align: center;">Plane</h3> <p style="text-align: center;"><i>(expensive and tedious)</i></p> 
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Present

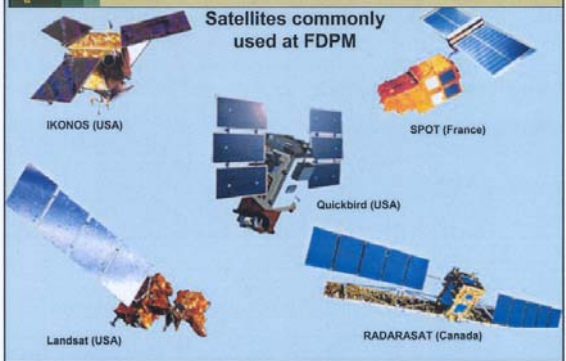
- Since 1998, Remote Sensing images were used to detect illegal logging but only after receiving reports & complaints

On the way


- FDPM initiated usage of Remote Sensing images at more real-time monitoring of logging with closed cooperation from MACRES

Forest Monitoring From The Sky

Satellites commonly used at FDPM



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RAZAKSAT

MALAYSIAN'S NEW FRONTIER OF DISCOVERY

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Satellites commonly used at FDPM

Sensor	Spatial Resolution	Spectral Bands	Effective Revisit Time	Area Covered	Cost
Landat TM/MSS	30 meters	7 bands	15 days	175 x 175 km	<\$.05/eq.km.
SPOT	5, 10, and 20 meter	1 band and 4 bands	1-3 days	60 km x 80 km	>\$.75/eq.km.
MODIS	250, 500, and 1000 meter	36 bands	Daily	2300 km	<\$.01/eq.km.
Radar	25 m	3 bands	1-3 days	100 x 100 km	<\$.05/eq.km.
RazakSAT	2.5 and 5 m	5 bands	6-24 hours	20 x 20 km	?

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What indicators of logging can be detected by remote sensing?

- **Direct Indicators:**
 - Forest openings
 - Roads, trails, landing sites
- **Indirect Indicators:**
 - Thinning canopy
 - Canopy changes over time




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Monitoring forest at two scales :


Macro

Encroachment of Permanent Forest Reserve (PFR) every 1 or 6 months



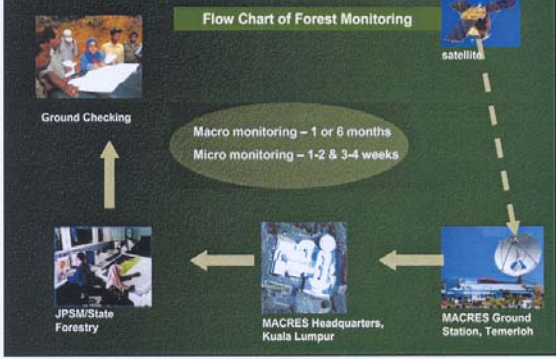
Micro

Logging at Licensed area every 1-2, and 3-4 weeks



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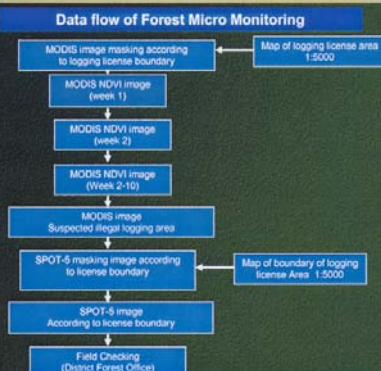
Flow Chart of Forest Monitoring



The flow chart illustrates the monitoring process: Satellite data is received at the MACRES Ground Station (Temerloh). It is then processed at MACRES Headquarters (Kuala Lumpur). The data is then used for Macro monitoring (1 or 6 months) and Micro monitoring (1-2 and 3-4 weeks). Ground checking is conducted, and the results are reported to JPSM/State Forestry.

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Data flow of Forest Micro Monitoring



The data flow process starts with a Map of logging license area (1:5000). This is used to mask MODIS NDVI images (week 1, week 2, and week 2-10). A MODIS image is used to identify suspected illegal logging areas. A SPOT-5 image is then masked according to the license boundary (using a 1:5000 map). The final step is Field Checking at the District Forest Office.

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Data required :

- ▶ Satellite image - MODIS
- ▶ Satellite image - SPOT 2.5m
- ▶ Digital data – PRF's boundary 1:50 000
- ▶ Digital data – licensed's boundary 1:5 000

Equipment required :

- ▶ PC, software and plotter of high capacity
- ▶ Good internet network
- ▶ GPS (for ground checking)

