Malaysian Remote Sensing Agency (REMOTE SENSING MALAYSIA)
Ministry of Science, Technology and Innovation (MOSTI)
http://www.remotesensing.gov.my Tel: 603-26973400 Fax; 603-26973350

THE UTILIZATION OF REMOTE SENSING AND GIS TECHNOLOGY IN VARIOUS APPLICATIONS FOR SUSTAINABLE DEVELOPMENT IN MALAYSIA

BY

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MALAYSIAN REMOTE SENSING AGENCY
Ministry of Science, Technology and Innovation (MOSTI)

9-12 SEPTEMBER 2008

UN/AUSTRIA/ESA SYMPOSIUM 2008 "SPACE TOOLS AND SOLUTIONS MONITORING THE ATMOSPHERE AND LAND COVER" GRAZ, AUSTRIA

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PRESENTATION OUTLINE

- **INTRODUCTION**
  - MALAYSIAN REMOTE SENSING AGENCY
  - OPERATIONALISATION OF REMOTE SENSING AND RELATED TECHNOLOGIES
- **MAIN FOCUS :**
  - HUMAN RESOURCE & INFRASTRUCTURE CAPACITY BUILDING
  - APPLICATION DEVELOPMENT
  - TECHNOLOGY DEVELOPMENT AND BASIC RESEARCH
  - USER-SERVICES AND TECHNOLOGY PROMOTIONS
- **CONCLUSION**

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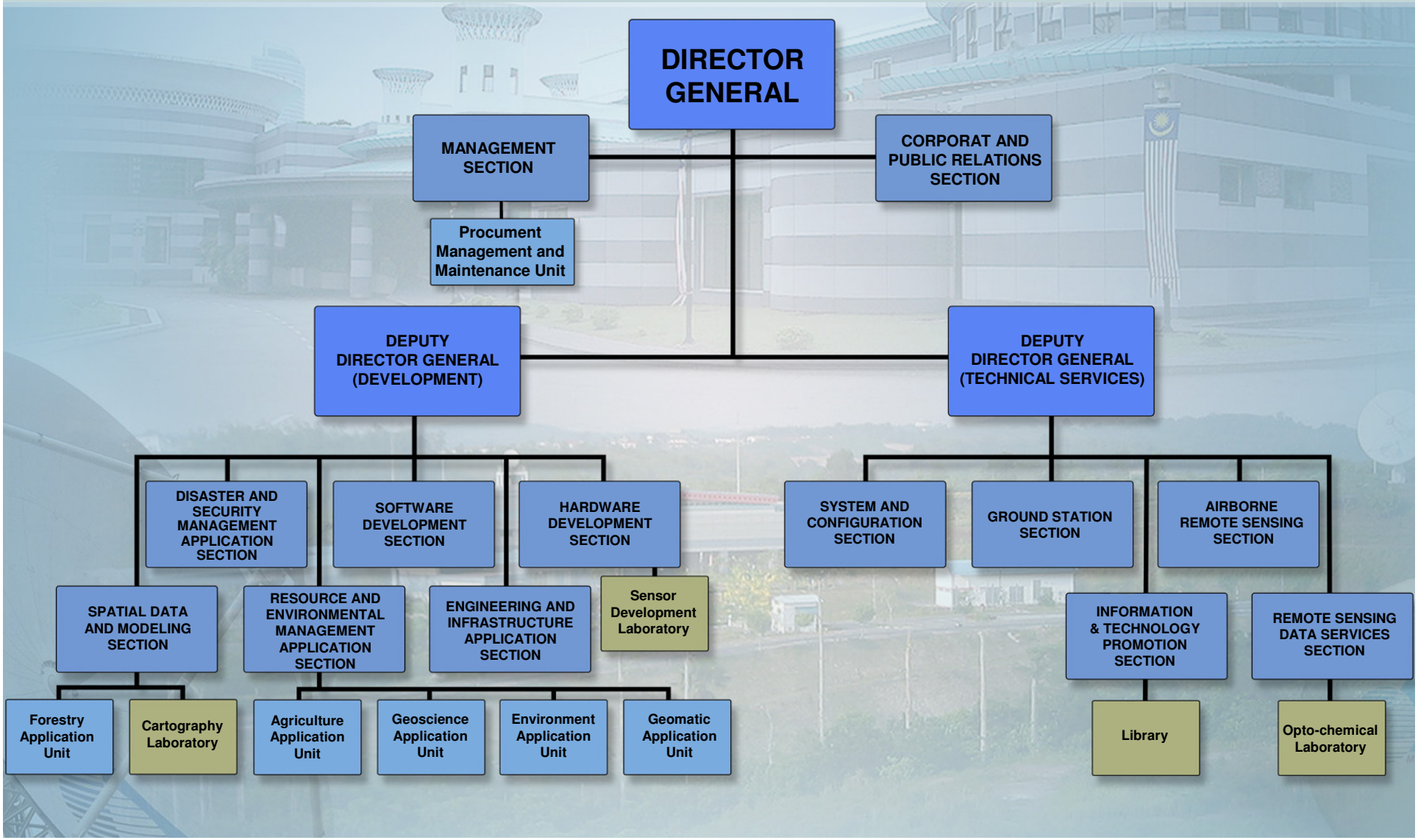
MALAYSIAN REMOTE SENSING AGENCY

- ✓ Formerly known as Malaysian Centre for Remote Sensing (MACRES) - established as an R&D centre in August 1988
- ✓ Upgraded to a department status with the new name; Malaysian Remote Sensing Agency, on 15 February 2008
- ✓ 250 staff including scientists, engineers and contract researchers.

WHERE ARE WE LOCATED

QUICKBIRD PAN-SHARPEN 0.6m IMAGE OF REMOTE SENSING MALAYSIA

ORGANISATION CHART



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OBJECTIVE

To develop remote sensing and related technologies applications for their operationalisation in user agencies for management of natural resources, environment and disasters, security, land and infrastructure development of the nation

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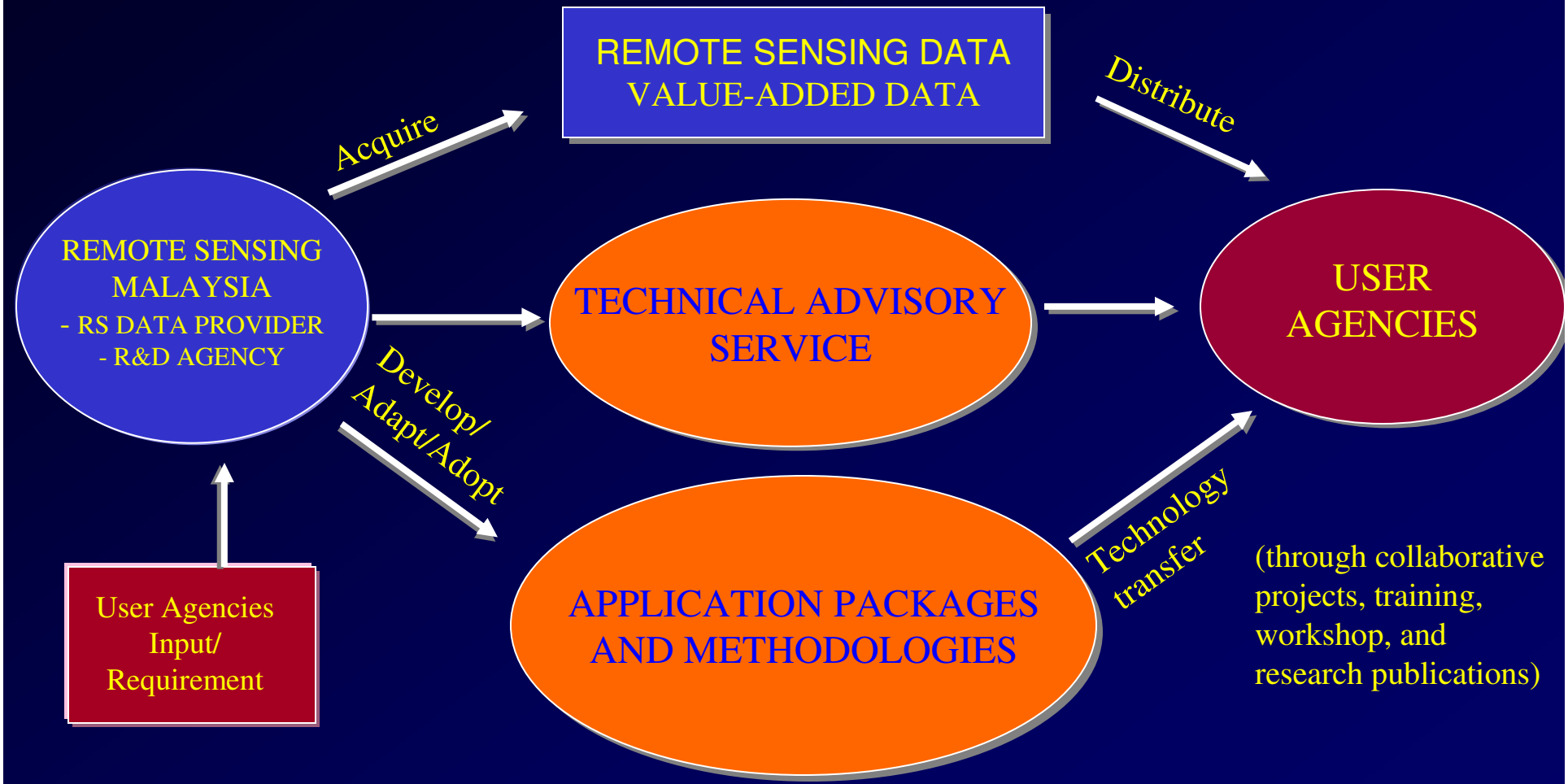
STRATEGIC FOCUS

- R&D (applications and technology development);
- Centralised remote sensing satellite image provider; and
- Technical advisory and technology promotion.

MECHANISM FOR OPERATIONALISATION OF RS AND RELATED TECHNOLOGIES



TECHNICAL WORKING GROUP ON REMOTE SENSING

Chairman : Malaysian Remote Sensing Agency

Members :

1. EPU, Prime Minister's Department
2. National Security Council
3. Defence Geospatial Division, MINDEF
4. Risik 3, MINDEF
5. PDRM
6. Department of Surveying and Mapping Malaysia
7. Department of Agriculture
8. Department of Forestry
9. Department of Fishery
10. Department of Environment
11. Department of Irrigation and Drainage
12. Department of Mineral and Geoscience
13. Department of Public Work
14. Department of Town and Country Planning
15. Ministry of Plantation Industries and Commodities
16. Ministry of Housing and Local Goverment
17. Ministry of Higher Learning
18. Sabah State Secretary Department
19. Chief Minister's Department, Sarawak
20. Sarawak Land and Survey Department
21. National Space Agency (ANGKASA)
22. Malaysian Meteorological Department

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HUMAN RESOURCE AND CAPACITY BUILDING

MALAYSIAN REMOTE SENSING AGENCY - HQ

OPERATIONS ROOM

LIBRARY

TRAINING FACILITIES

WORKSTATION

DATA CHAMBER

VITTUAL REALITY

OPTO-CHEMICAL LABORATORY

ANECHOIC CHAMBER

MOBILE SCATTEROMETER

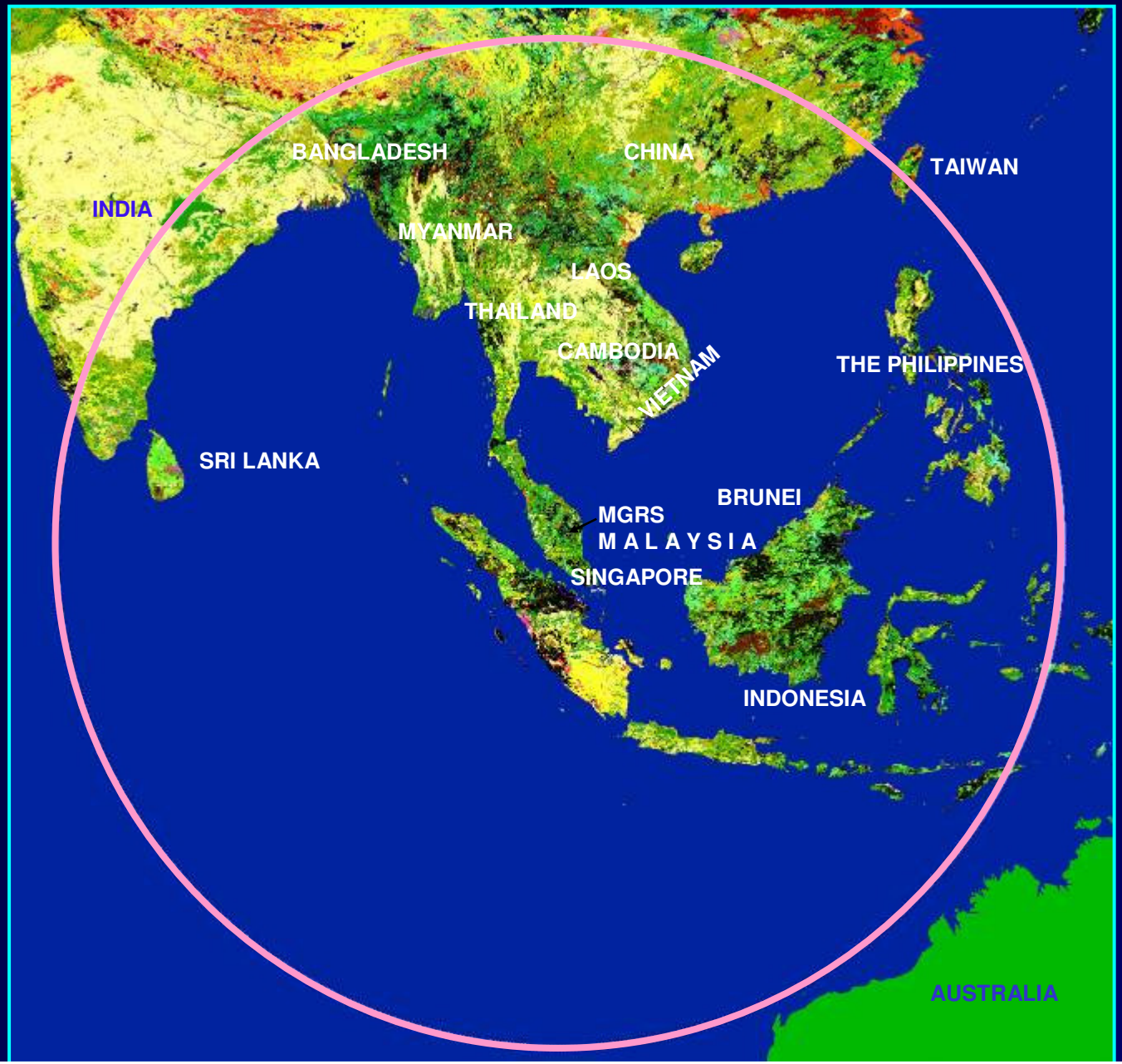
GROUND RECEIVING STATION
Temerloh, Pahang

RECEIVES SATELLITE DATA FROM SPOT, RADARSAT, NOAA, MODIS AND IRS-P4 (OCM)

Acquisition and Reception System

Management, Archiving and Processing System

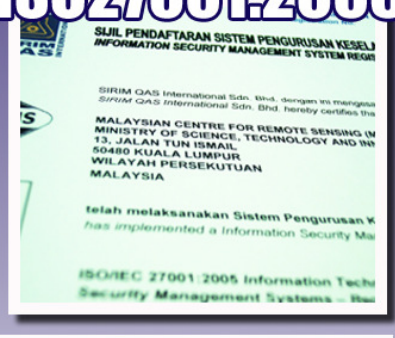
MARSA GROUND RECEIVING STATION (MGRS) – 2500 KM RADIUS COVERAGE



MALAYSIAN REMOTE SENSING AGENCY COMPUTER SYSTEM

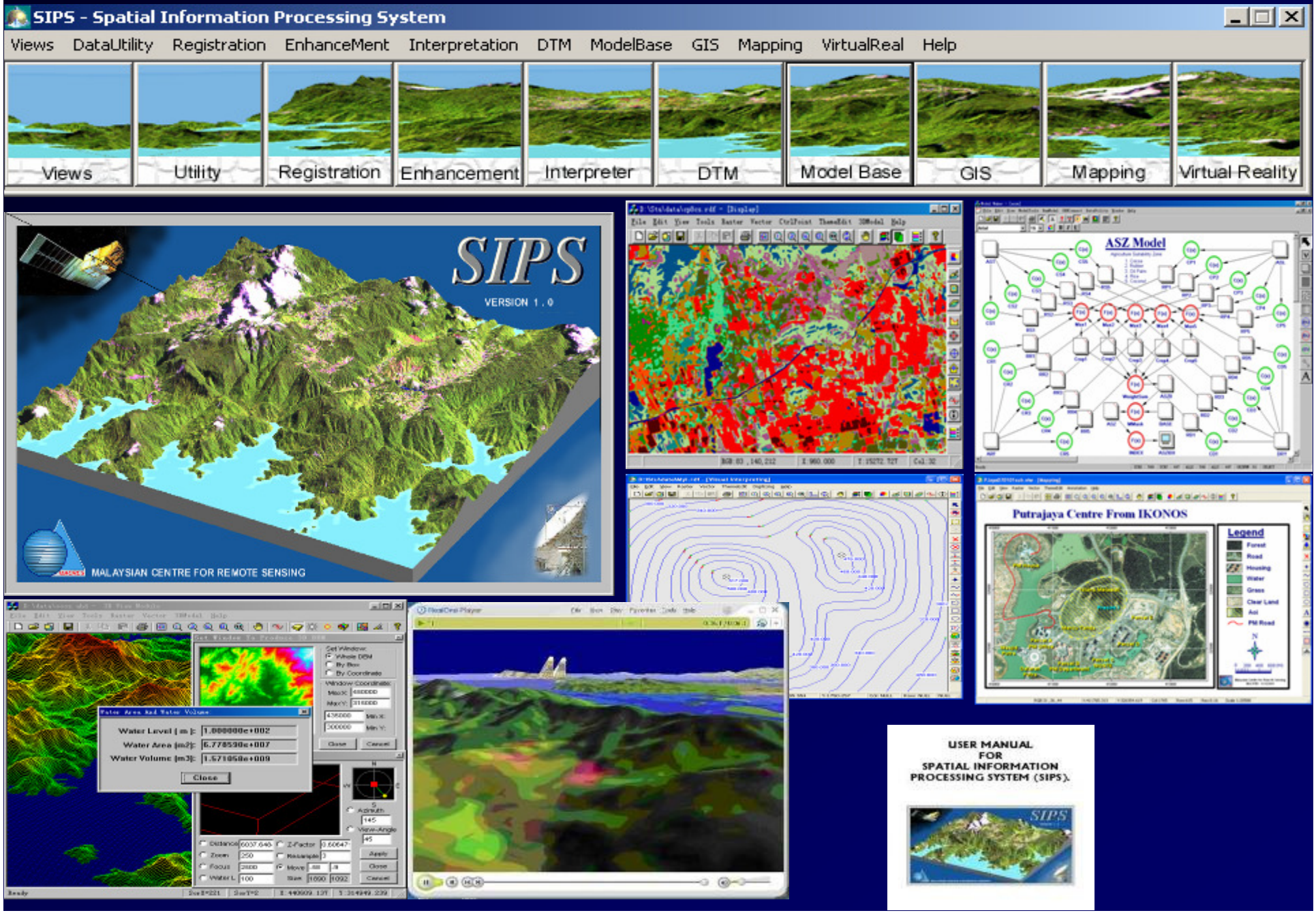
SERVER ROOM

ISMS ISO27001:2005



PRINTING & IMAGE PROCESSING FACILITIES

SOFTWARE DEVELOPMENT



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USER-SERVICES AND TCEHNOLOGY PROMOTIONS

DATA PRODUCTS AND SERVICES

- MULTI RESOLUTION IMAGERY TO MEET MULTISCALE NEEDS (FROM 0.6 m to 1 km)
- STANDARD AND VALUE-ADDED DATA PRODUCTS
- PHOTOGRAPHIC PRODUCTS
- CUSTOM ACQUISITION VIA SATELLITE PROGRAMMING SERVICES

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TRAINING/ PROMOTIONS/ SEMINAR

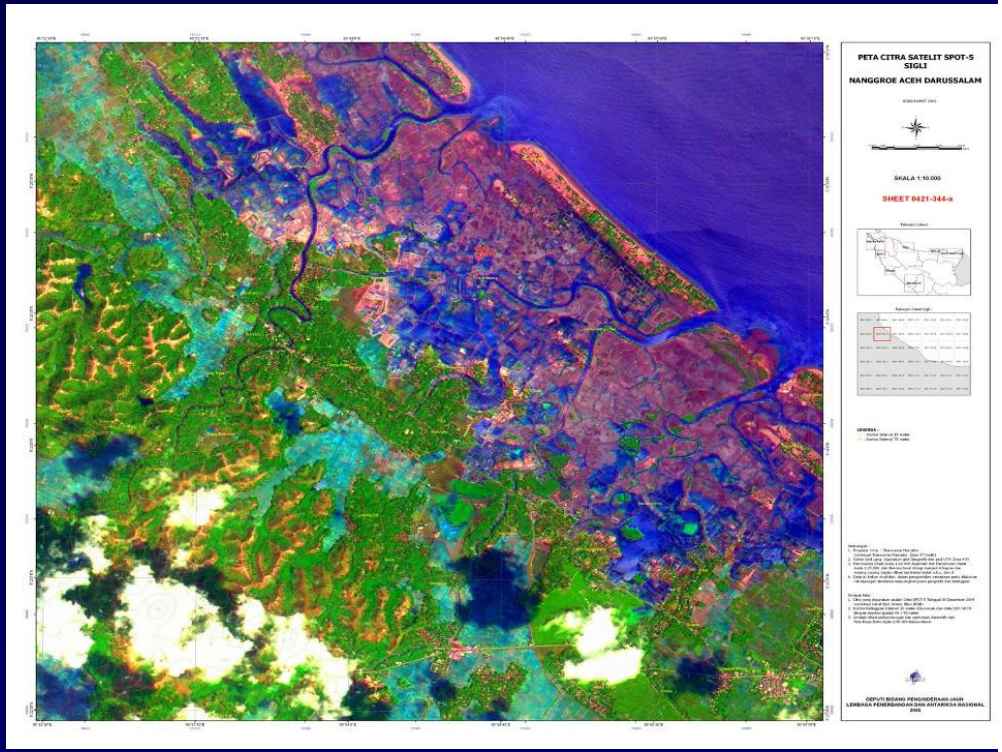
INTERNATIONAL COLLABORATORS

Australia (ACRES, CSIRO, UNSW)
Canada (CCRS, CSA)
China (NRSCC, CSDA, IECAS, SITP, BNU)
European Space Agency (ESA)
France (CNES)
India (IRSA, ISRO)
Indonesia (LAPAN)
Japan (JAXA)
Singapore (CRISP)
South Africa (NCSR)
Sweden (SSC)
Thailand (GISTDA)
The Netherlands (ITC)
UK (NRSC)
United States (NASA, JPL, MIT, UCLA, USGS, UTA)
Vietnam (NCNST, HIO)

REGIONAL REMOTE SENSING DATA SHARING

MACRES PROVIDE REMOTE SENSING DATA TO LAPAN, INDONESIA TO SUPPORT RECONSTRUCTION OF:

- **ACEH AFTER THE TSUNAMI DISASTER IN DECEMBER 2004.**
- **YOGJAKARTA EARTHQUARKE IN 2006**



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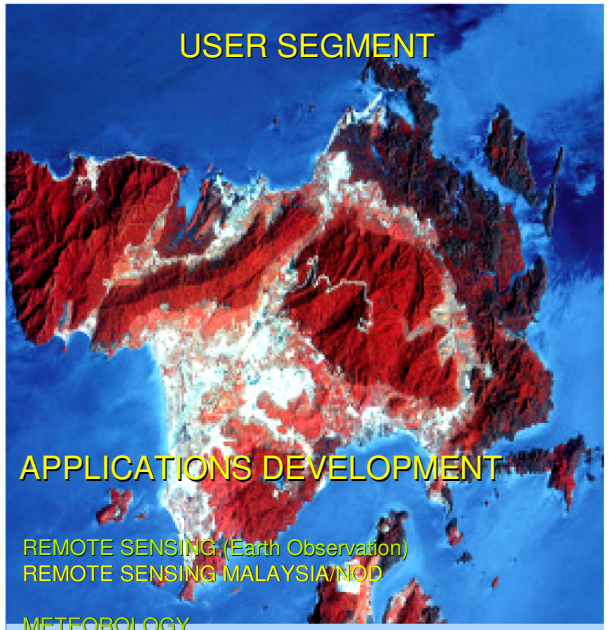
APPLICATION DEVELOPMENT

NATIONAL PROGRAMME ON SPACE TECHNOLOGY DEVELOPMENT AND APPLICATIONS

USER SEGMENT



APPLICATIONS DEVELOPMENT

REMOTE SENSING (Earth Observation)
REMOTE SENSING MALAYSIA/NOD

METEOROLOGY
MALAYSIAN METEOROLOGICAL DEPARTMENT

COMMUNICATIONS
MINISTRY OF ENERGY, WATER AND COMMUNICATION

GLOBAL POSITIONING SYSTEM AND NAVIGATION
REMOTE SENSING MALAYSIA/JUPEM

SPACE SCIENCE
ANGKASA

GROUND SEGMENT

Airborne System

Data Reception

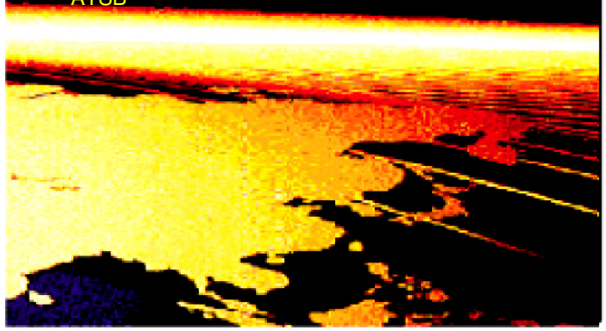
Processing

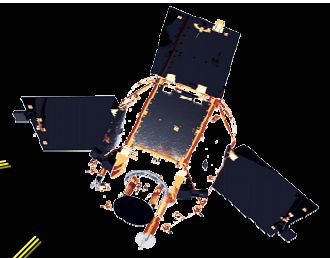
SPACE SEGMENT

Satellite System

TECHNOLOGY DEVELOPMENT

- SATELLITE DESIGN AND INTEGRATION
  ATSB
- SENSOR / PAYLOAD DEVELOPMENT
  REMOTE SENSING MALAYSIA/ATSB
- ATTITUDE & ORBIT CONTROL
  ATSB
- TRACKING, TELEMETRY AND COMMAND
  ATSB





AGRICULTURE & SOIL

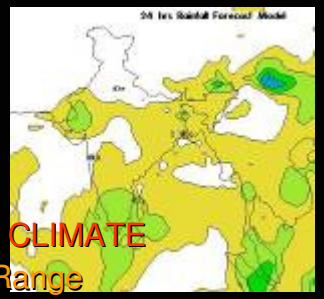
- Crop Acreage & Production Estimation
- Soil & Land Degradation Mapping
- Watershed Development
- Horticulture Mission for North-East

LAND

- Landuse/Land Cover Mapping
- Wasteland Mapping
- Urban & Geological
- Large Scale Mapping

FOREST, ENVIRONMENT, BIO

- Forest Cover & Type Mapping
- Forest Fire and Risk Mapping
- Biodiversity Characterisation
- Environmental Impact Studies



WEATHER & CLIMATE

- Extended Range Monsoon Forecasting
- Ocean State Forecasting

MILITARY & SURVEILLANCE

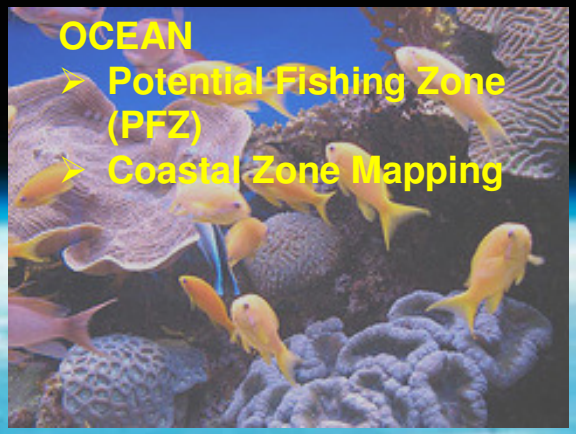
- Intelligence
- Mapping & Rescue Planning

WATER

- Potential Drinking Water Zones
- Command Area Management
- Reservoir Sedimentation

DISASTER SUPPORT

- Flood Damage Assessment
- Forest Fire
- Land Slide Hazard Zonation



OCEAN

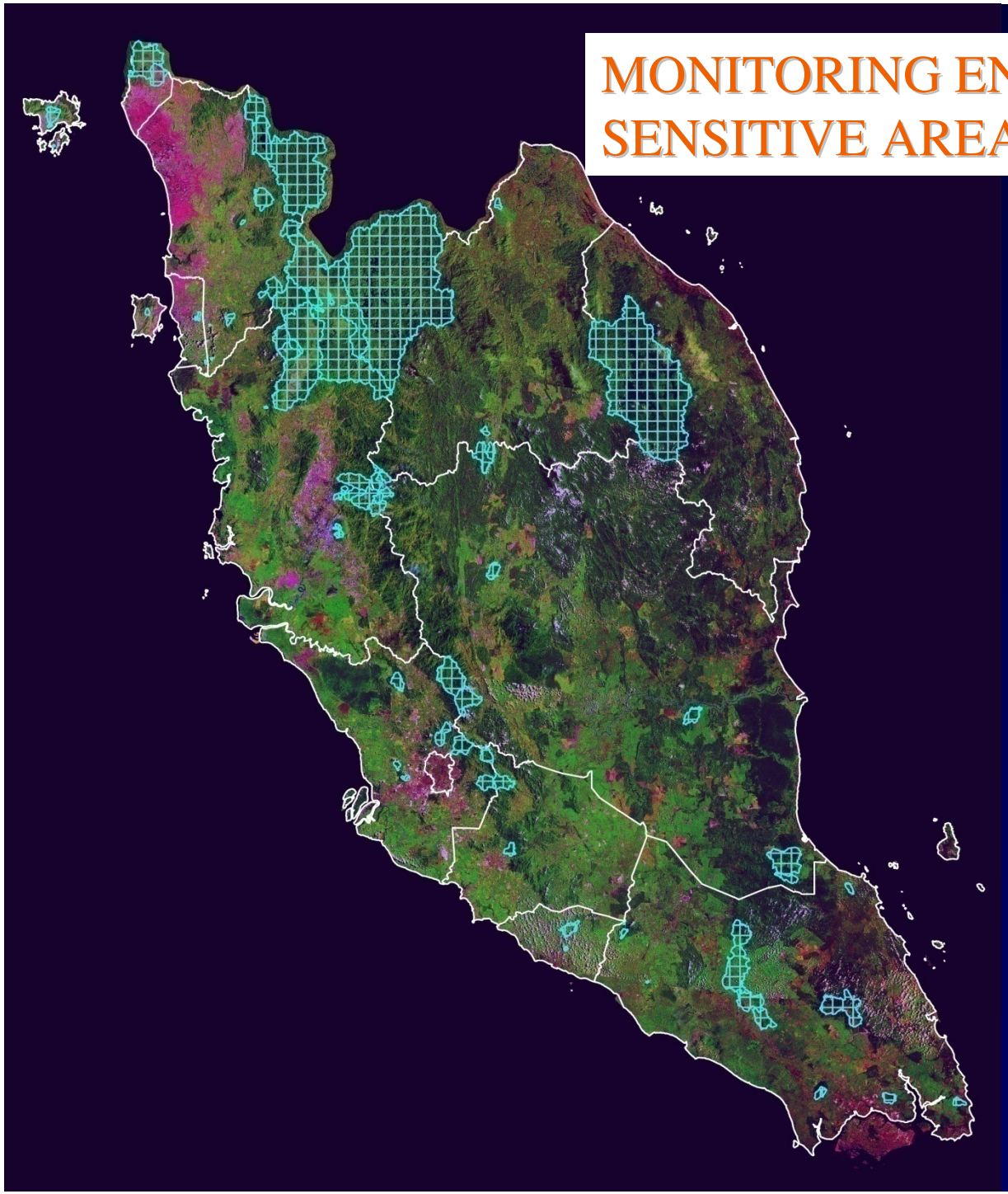
- Potential Fishing Zone (PFZ)
- Coastal Zone Mapping

REMOTE SENSING – APPLICATIONS

INTEGRATED GEOSPATIAL DATABASE AND PLANNING SYSTEM (IGDP SYSTEM)

- Natural Resources Management
  - National Biodiversity Database Development
  - Monitoring of Environmentally Sensitive Areas
  - Highlands and Islands Monitoring
  - Logging Monitoring
  - Ground Water Potential Zoning
  - Mineral Potential Zoning
- Agriculture
  - Precision Farming for Paddy and Oil Palm
  - Rice Yield Prediction
  - Rubber Replanting
  - Fishing Zone Identification
- Disaster Management
  - Forest Fire
  - Flood
  - Landslide
  - Tsunami
- Environmental Health and Epidemic Diseases
- National Security and Sovereignty

MONITORING ENVIRONMENTALLY SENSITIVE AREA

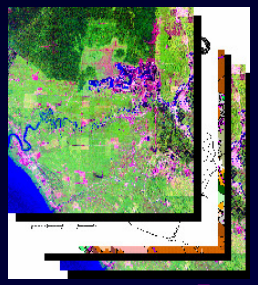


- Reservoir
- Irrigation
- Recreation

Pontian Dam

Ground Water Potential Zoning

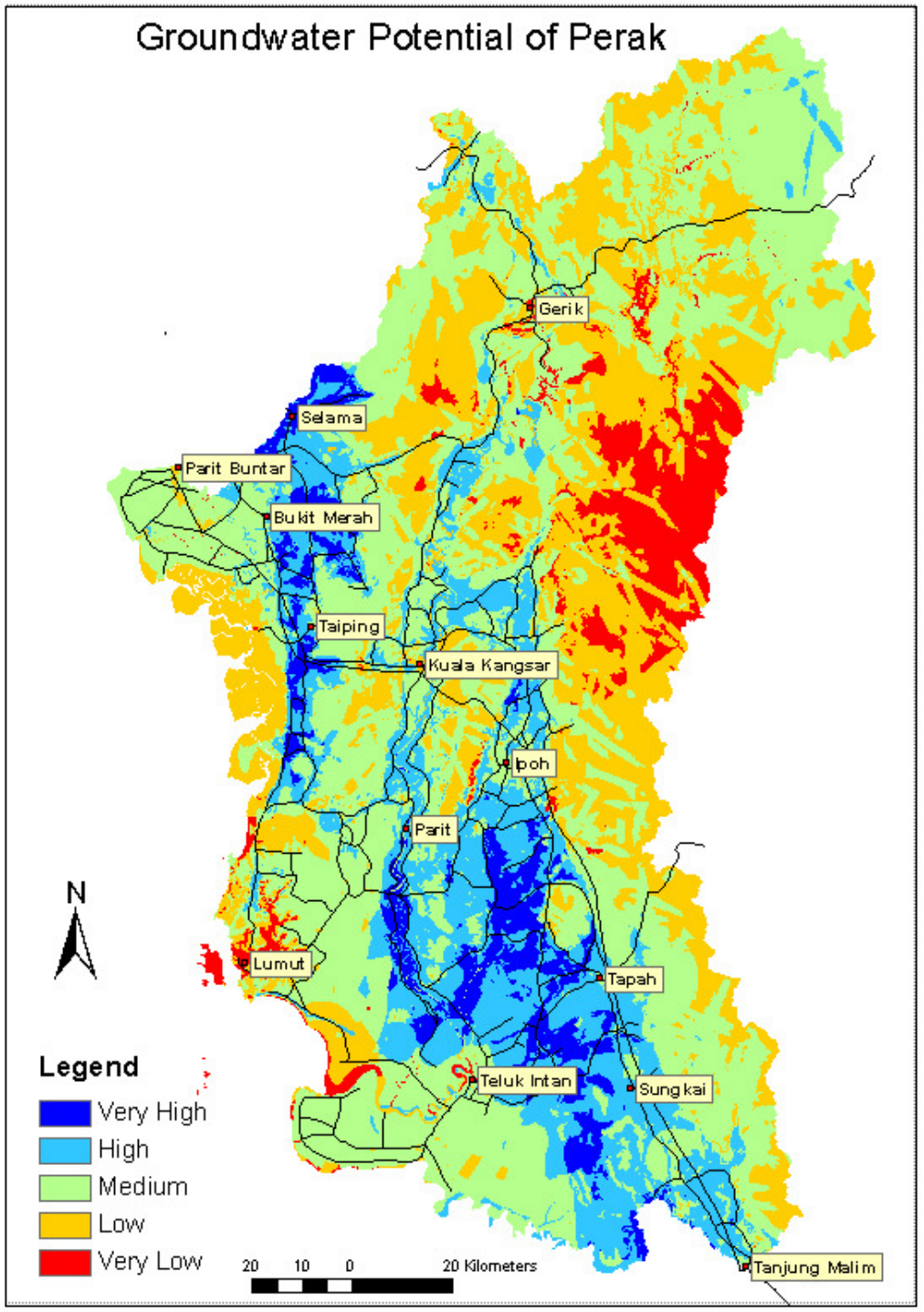
Base Layers



Geomorphology
Lithology
Slope
Rainfall
Lineament
Elevation

GWP Model

$$\bar{S} = \frac{\sum_{i}^{n} S_{ij} W_i}{\sum_{i}^{n} W_i}$$

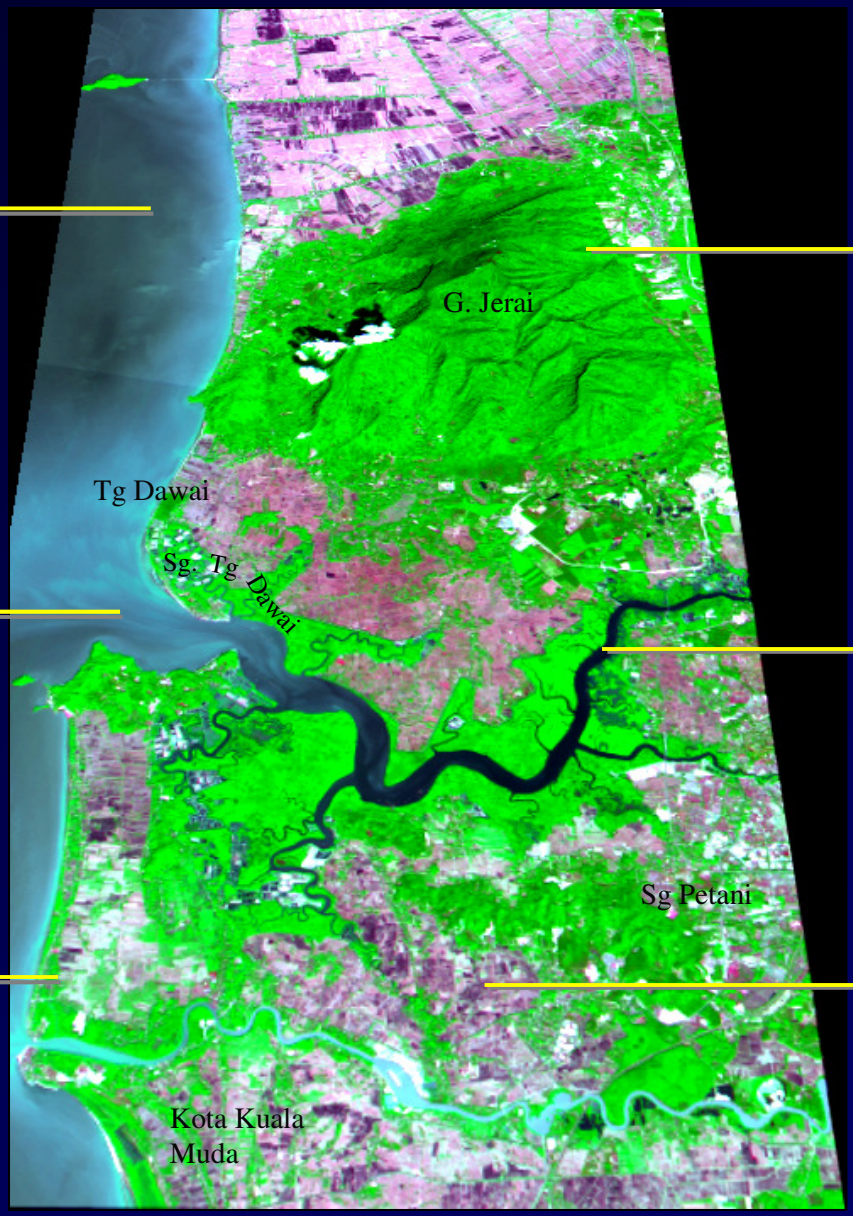


BIO-D LANDSCAPE DATABASE

Marine

Mangrove

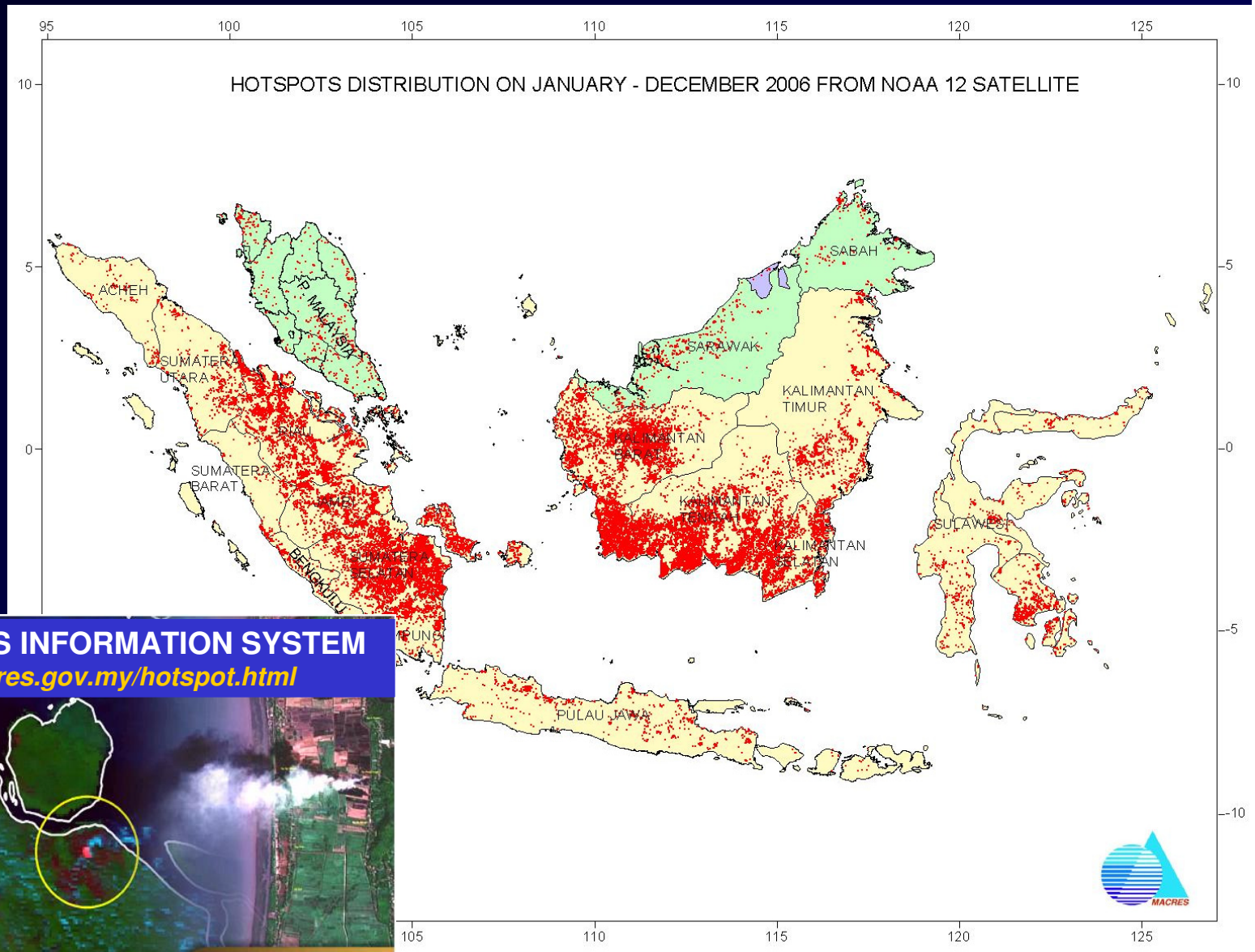
Coastal



Forest/Mountain

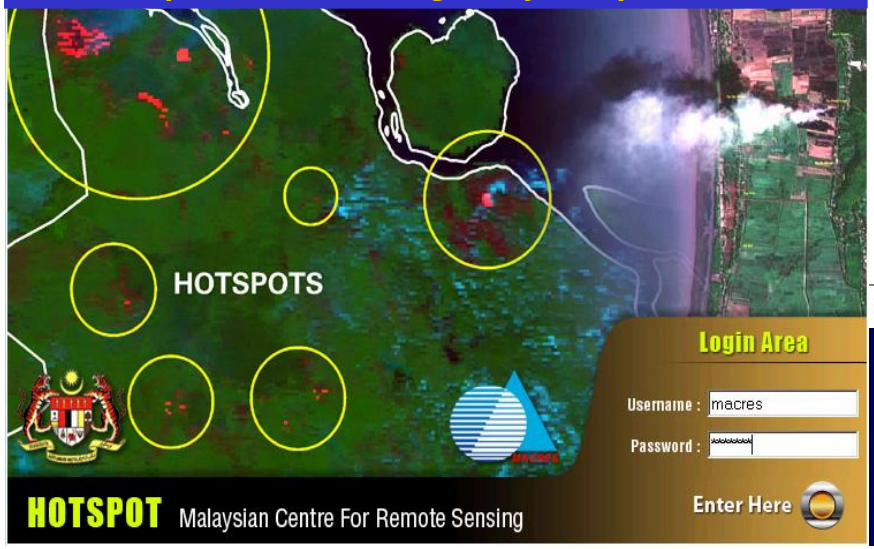
Inland Waters

Agriculture



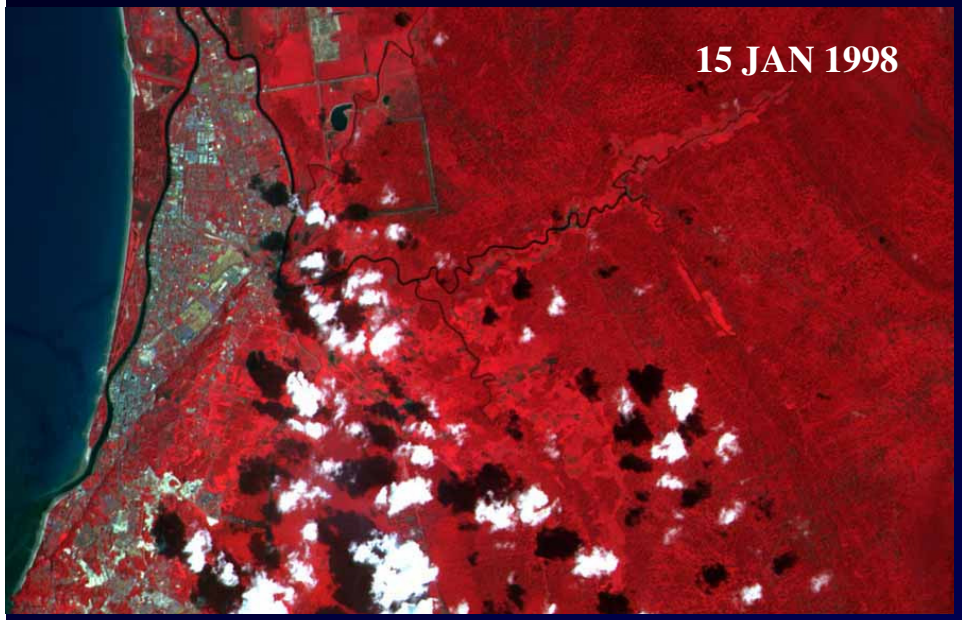
NADDI : HOTSPOTS INFORMATION SYSTEM

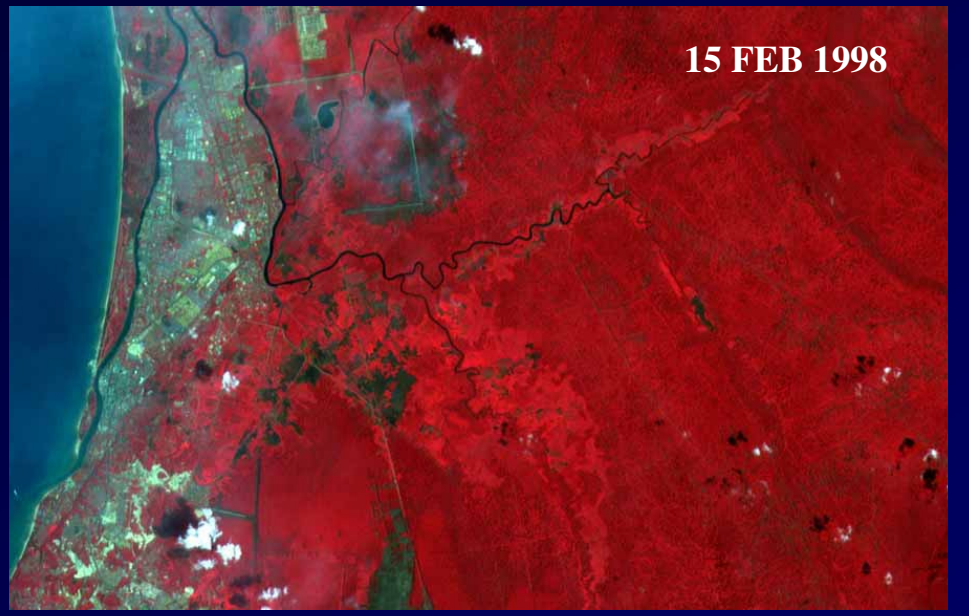
http://naddi.macres.gov.my/hotspot.html

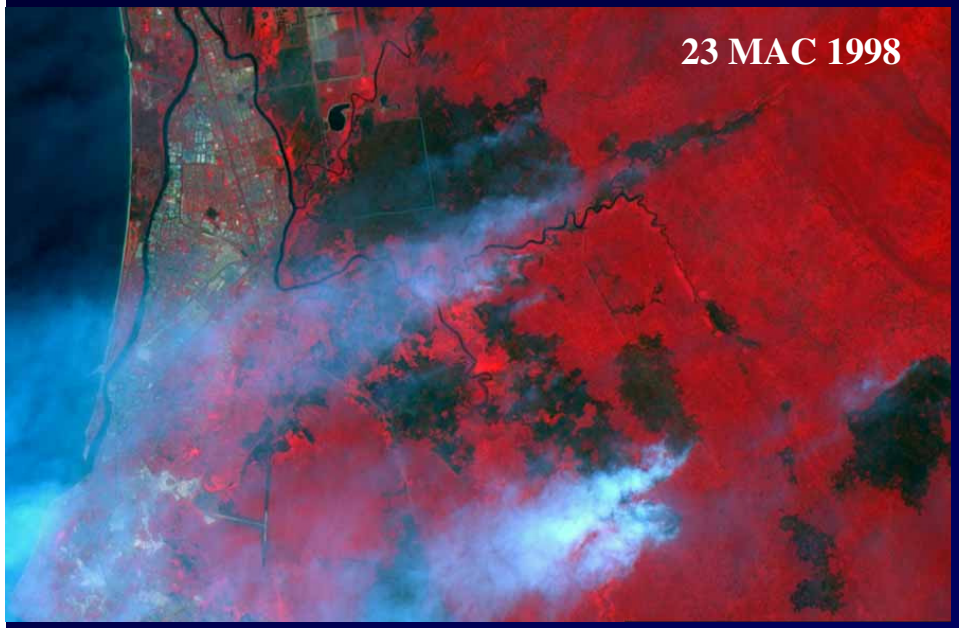


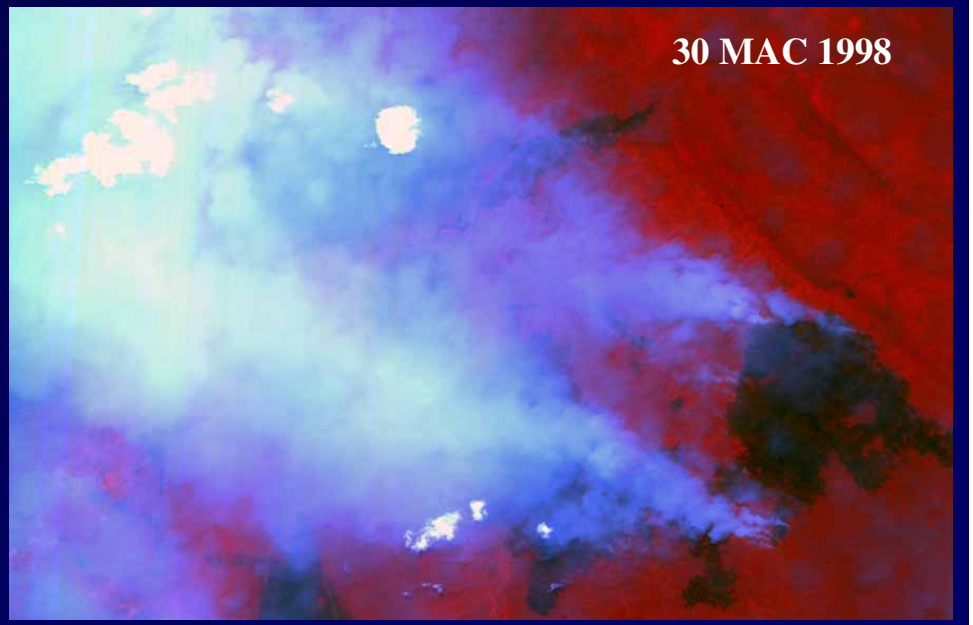
HOTSPOTS DISTRIBUTION

DETECTION AND MONITORING









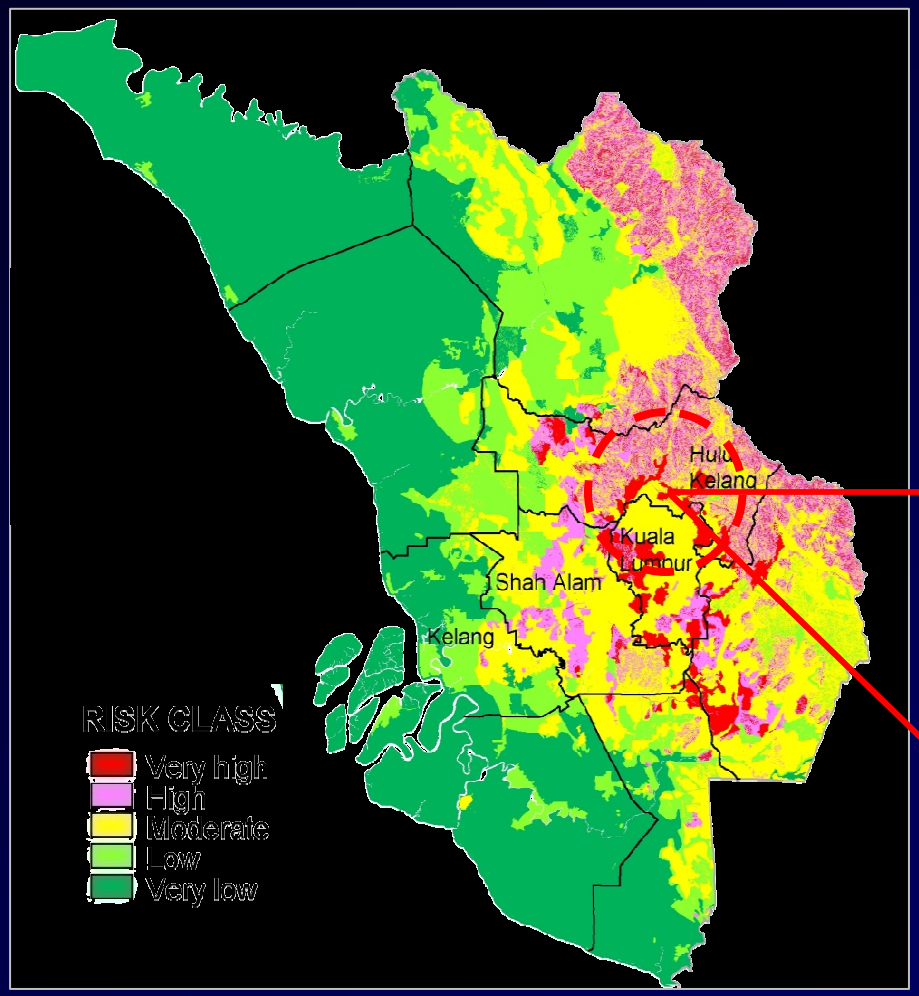
FIRE EVOLUTION – MIRI, SARAWAK

DETECTION AND MONITORING

OPEN BURNING DETECTED BY SPOT 5
ON THE 15 JAN 2005

HIGHLAND MANAGEMENT

MONITORING DEVELOPMENT ACTIVITIES IN HIGHLANDS



LANDSLIDE HAZARD MAP FOR :
- LANDUSE PLANNING
- DISASTER RISK REDUCTION

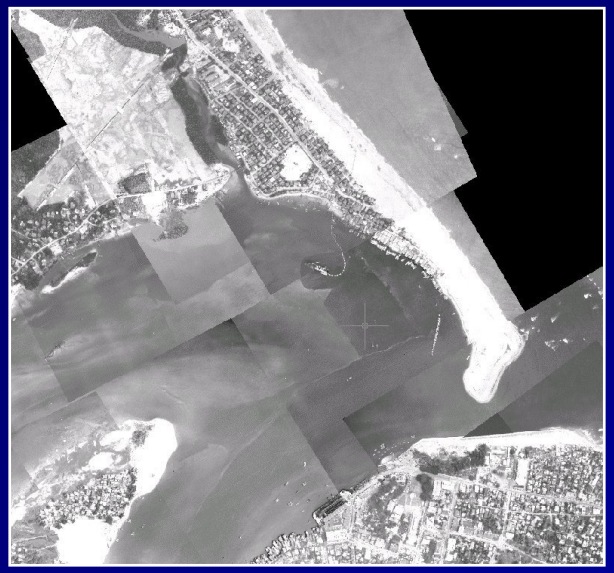
IKONOS Image Satellite of Hill View (20.11.2002)

Landslide Photograph at Kg. Pasir (30.05.2006)

INTEGRATED COASTAL ZONE MANAGEMENT

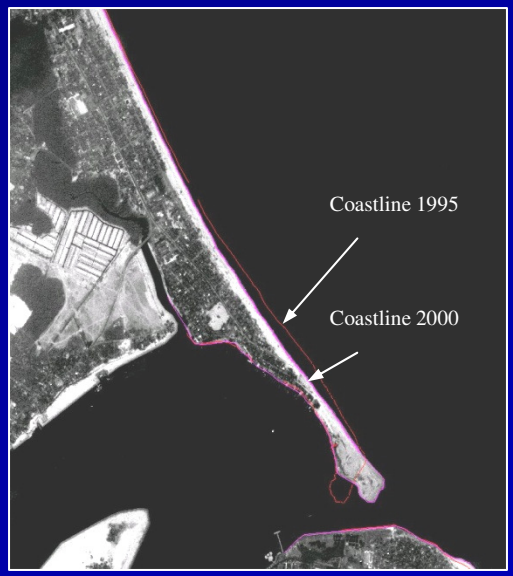
COASTAL EROSION AT KUALA TERANGGANU

– USING IKONOS IMAGE (1 M)

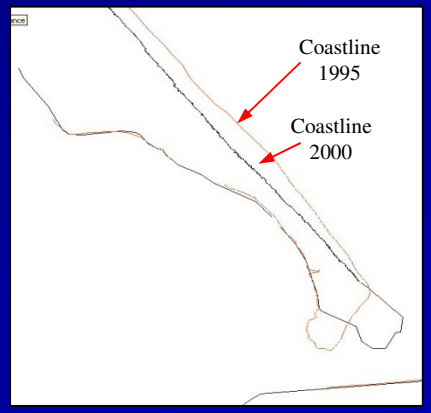


Aerial photograph 1995

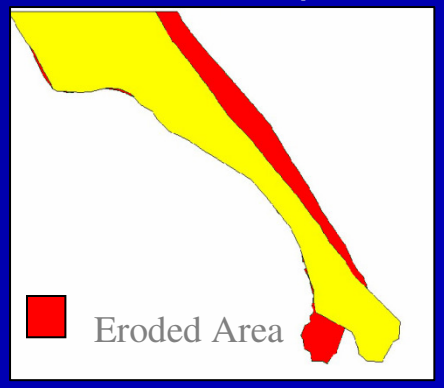
Ikonos 2000



Shoreline from aerial photo and Ikonos image

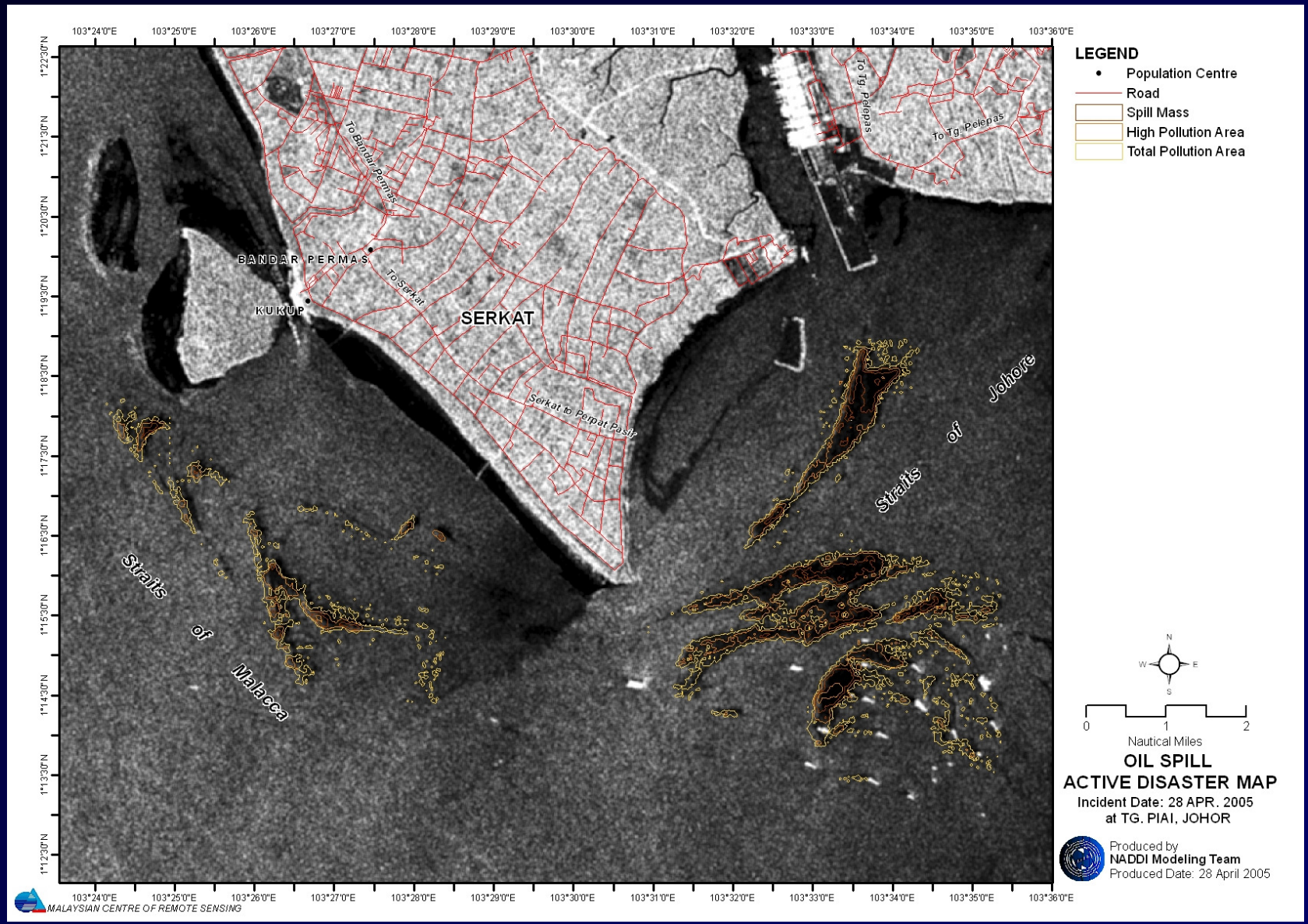


Combined shoreline map

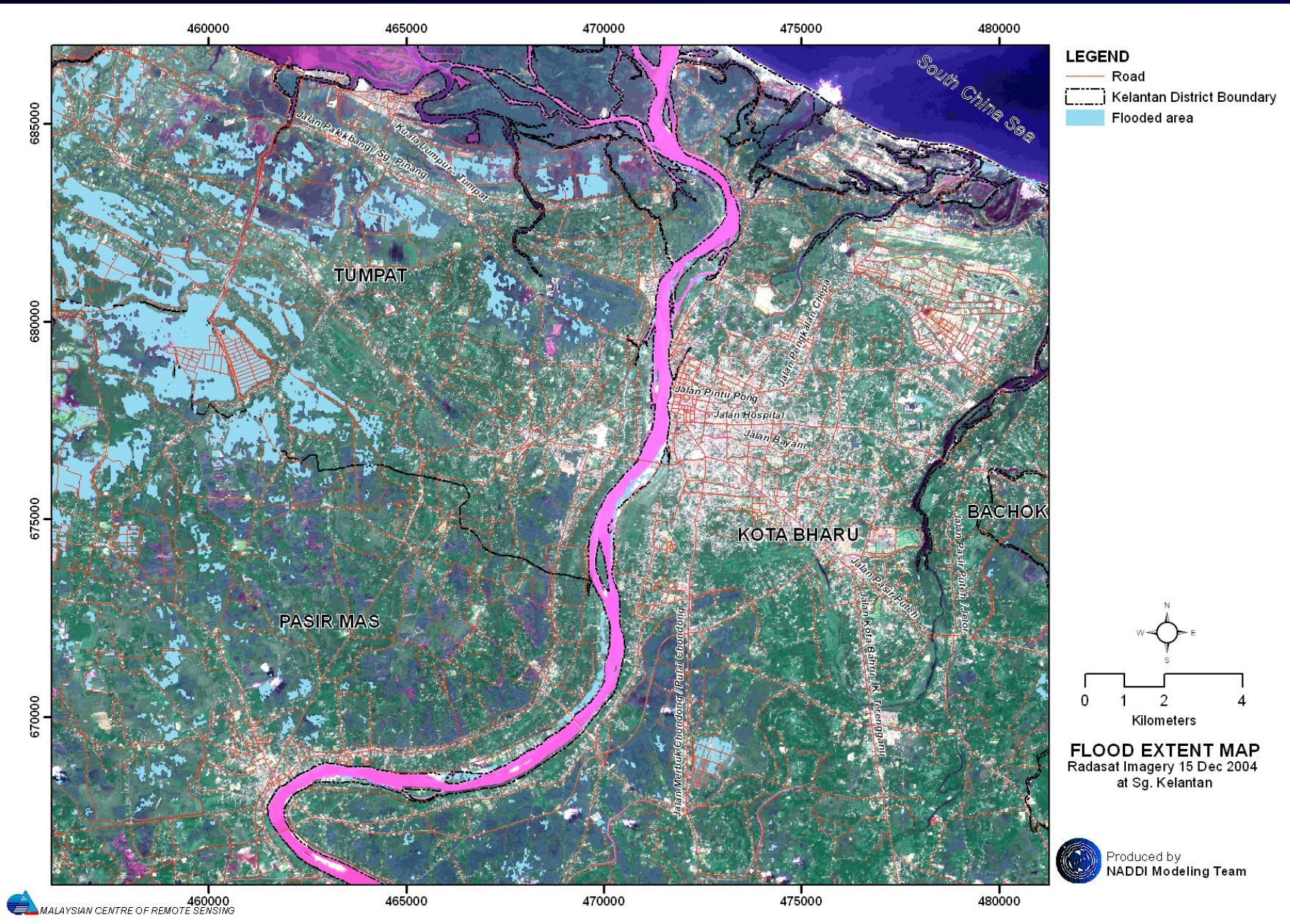


Eroded area at Sg. Terengganu estuary

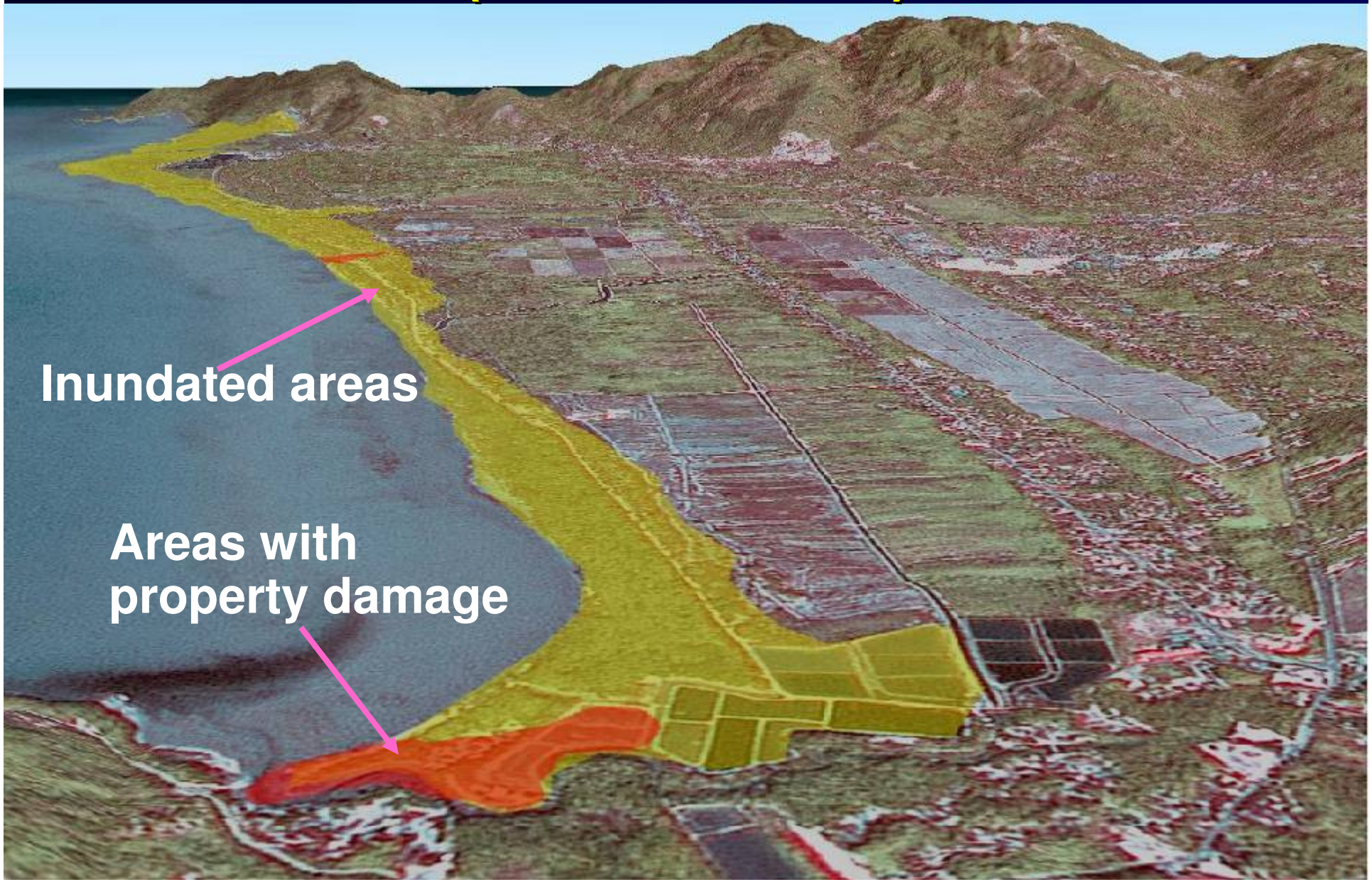
OIL SPILL ACTVE DISASTER MAP



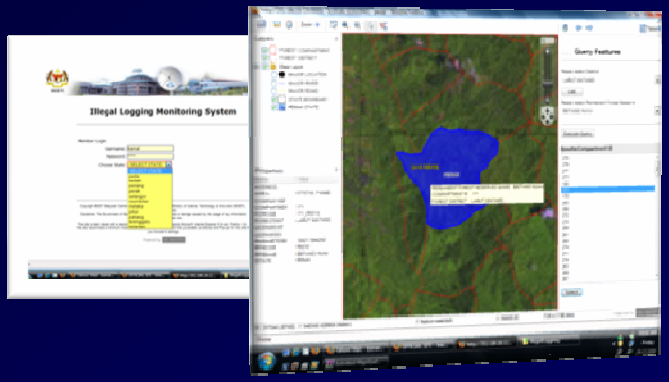
FLOOD EXTENT MAP



3-D TSUNAMI INUNDATION MAP (BALIK PULAU)



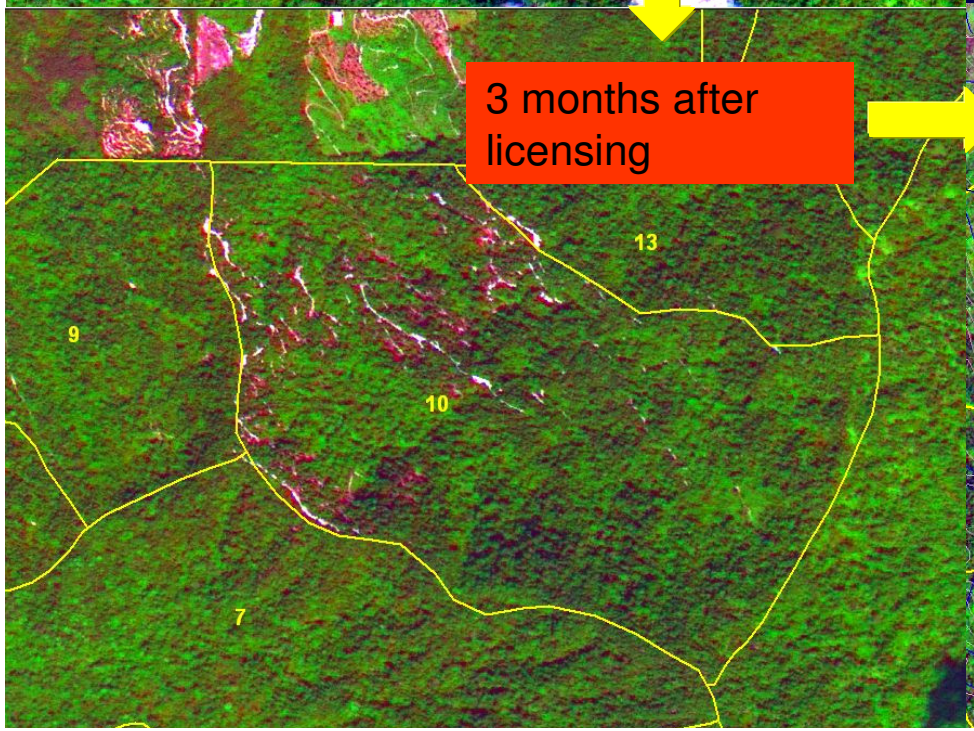
LOGGING MONITORING

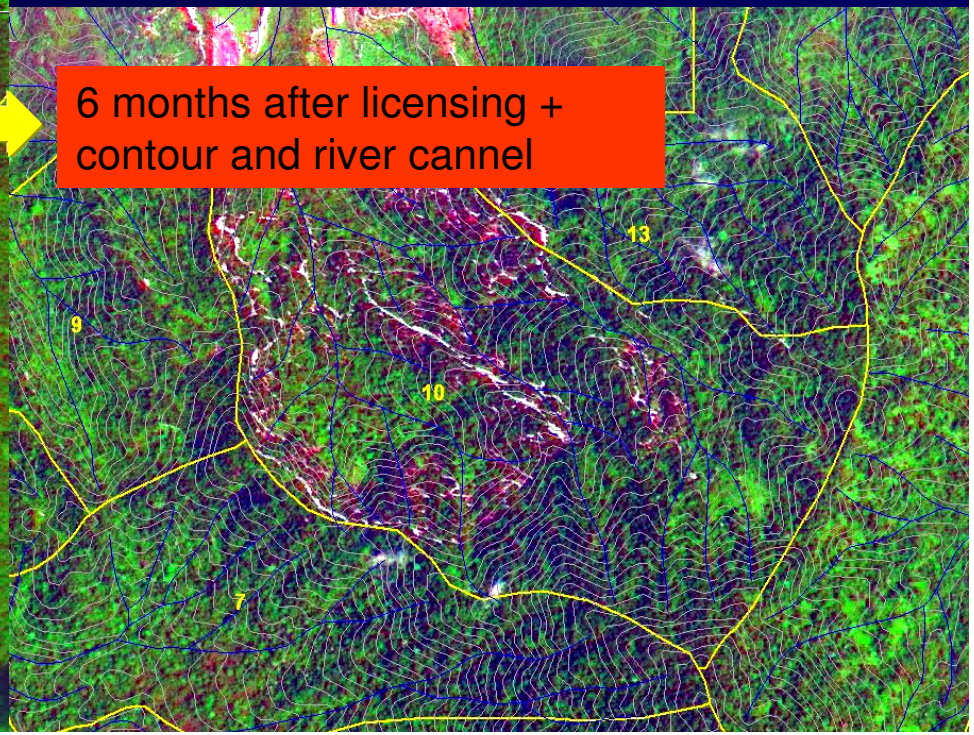


9 months before licensing

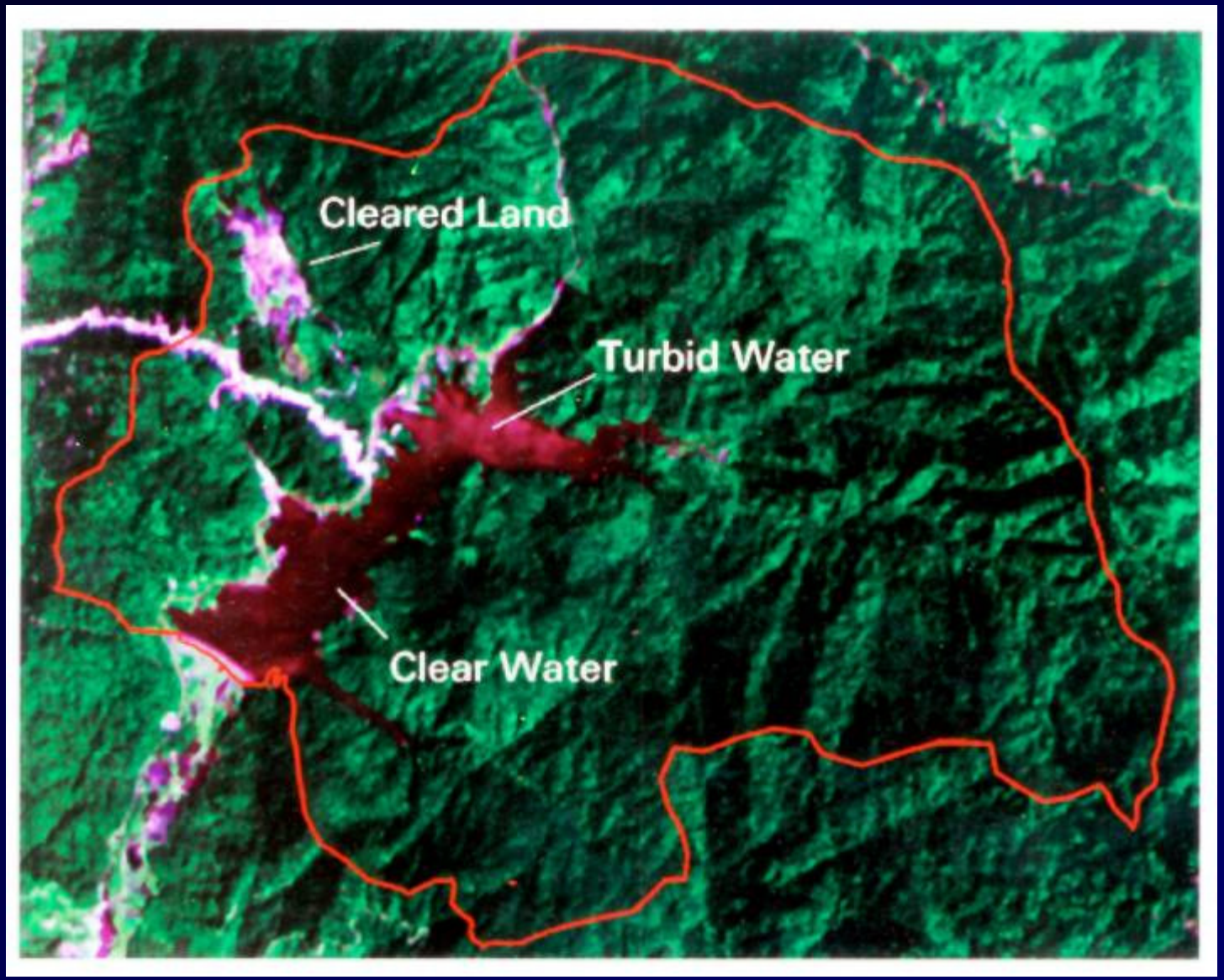
3 months after licensing

6 months after licensing + contour and river cannel





ENCROACHMENT OF SEMENYIH CATCHMENT AREA



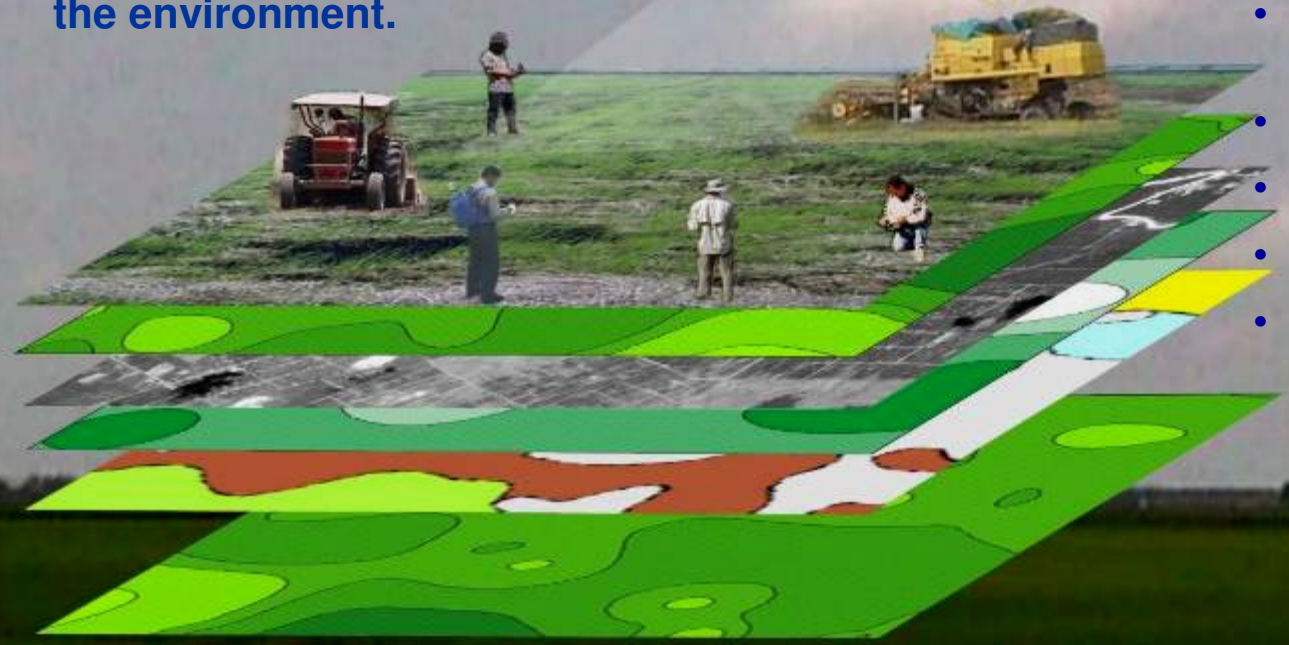
PRECISION FARMING

"RIGHT INPUT, RIGHT TIME, RIGHT PLACE AND RIGHT AMOUNT"

:

OBJECTIVE:

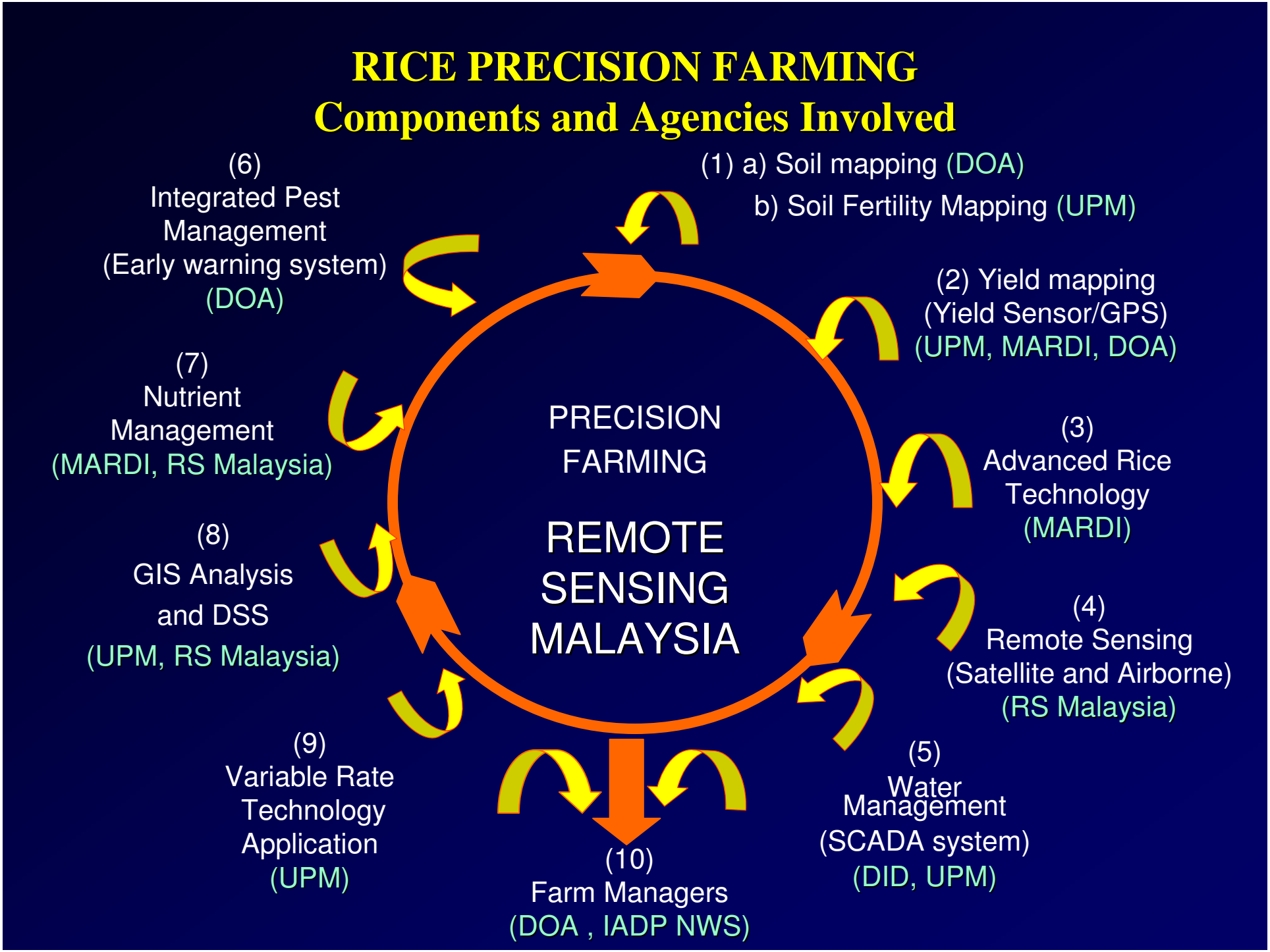
To increase crop production through the use of integrated remote sensing, GIS, GPS and sensor technologies incorporating advanced agronomic and farming practices, whilst maintaining the quality of the environment.



TECHNOLOGIES INVOLVED

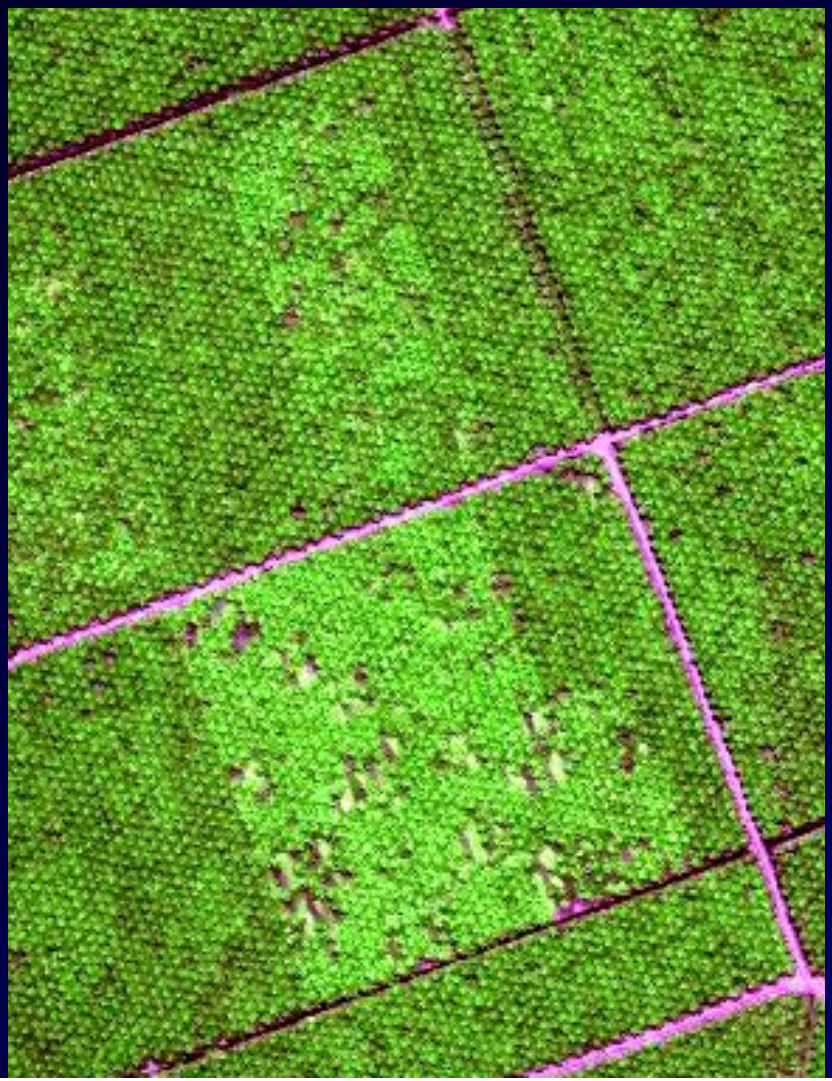
- Remote sensing, satellite navigation system
- Computer Geographical systems
- Automatic yield recording systems
- Automatic soil sensor
- Variable Rate Technology
- Advanced agronomy
- Advanced farm management

RICE PRECISION FARMING
Components and Agencies Involved



OIL PALM PRECISION FARMING

Mapping *Ganoderma* Disease



DETECT GANODERMA DISEASE

Disease and every single palm stand can be monitor. The area covered by specific type of disease can be measured and buffer zone can be created. The early warning system can be implemented

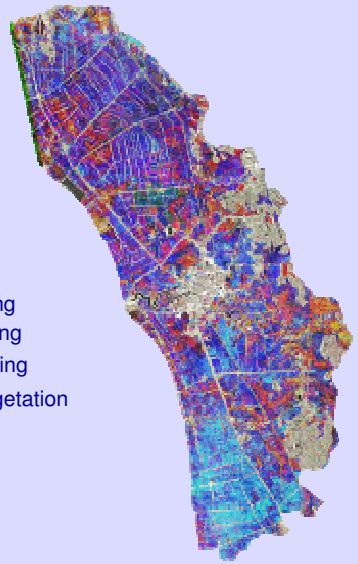
RICE MONITORING & YIELD PREDICTION SYSTEM USING MICROWAVE REMOTE SENSING AND GIS

SATELLITE DATA ACQUISITON & DIGITAL IMAGE PROCESSING

RADARSAT SATELLITE

PADDY GROWTH STAGES

MACRES HQ, KUALA LUMPUR

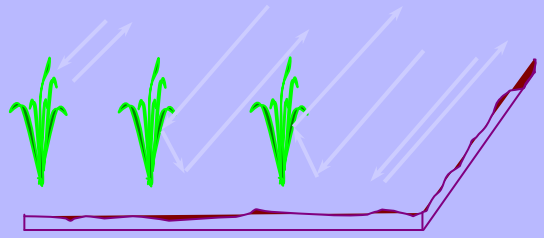


LEGEND

- Phase I Planting
- Phase II Planting
- Phase III Planting
- Non-paddy vegetation
- City

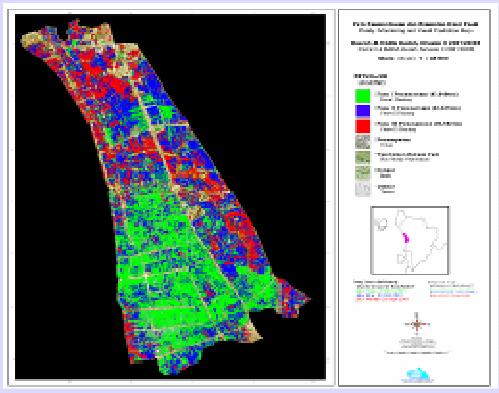
MULTI-TEMPORAL RADARSAT DATA OF MADA AREA

MODELLING



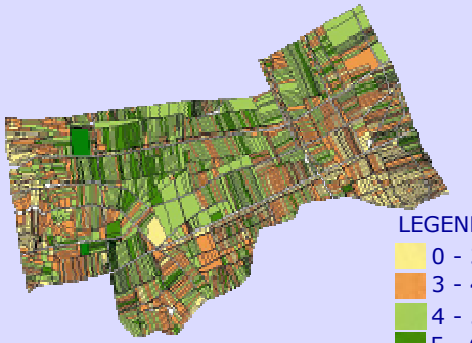
RICE YIELD PREDICTION MODEL

YIELD PREDICTION



MAPPING

- Cadastral Information
- Paddy Schedule
- Irrigation Schedule
- Lot Number



LEGEND

- 0 - 3 ton/ha
- 3 - 4 ton/ha
- 4 - 5 ton/ha
- 5 - 6 ton/ha
- 6 - 7 ton/ha

GEOGRAPHIC INFORMATION SYSTEM

FISHING ZONE IDENTIFICATION

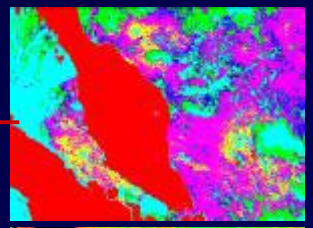
Observers onboard commercial fishing vessels
(Instantaneous Oceanographic, Biological & Catch Data)

Independent Boat Survey
(Sea Truth Data)

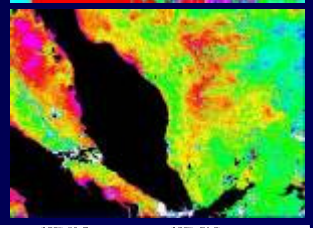
GIS Analysis

FISHING ZONE IDENTIFICATION MODEL

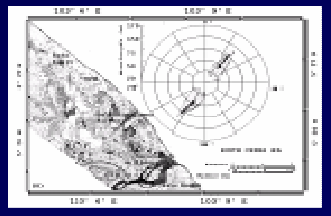
Satellite Images
(MODIS, OCM, AVHRR etc.)



Phytoplankton & Chlorophyll a

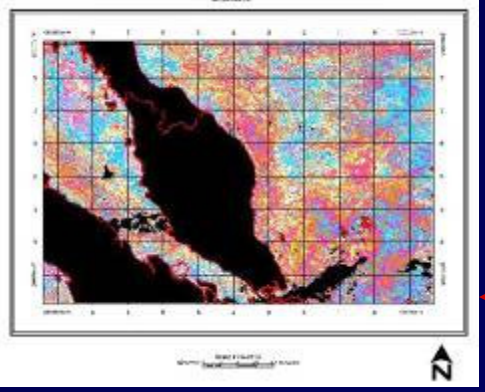


Sea Surface Temperature



Wave Spectra

Fishing Zone Map

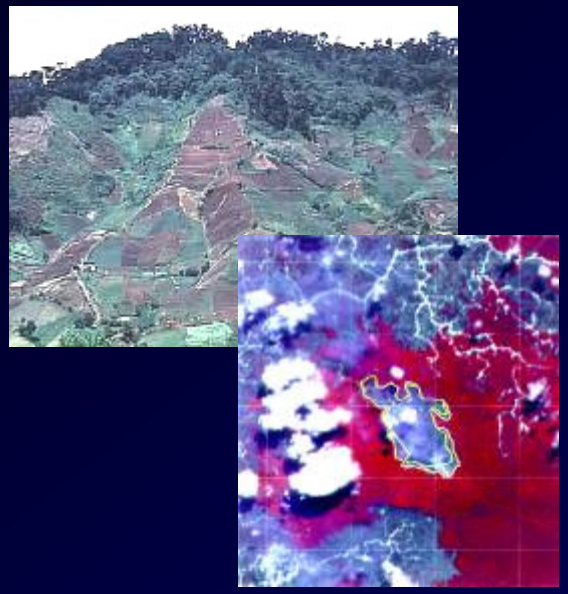


Communication

-email via Satellite Phone & Onboard Navigational Software
-Hard Copy

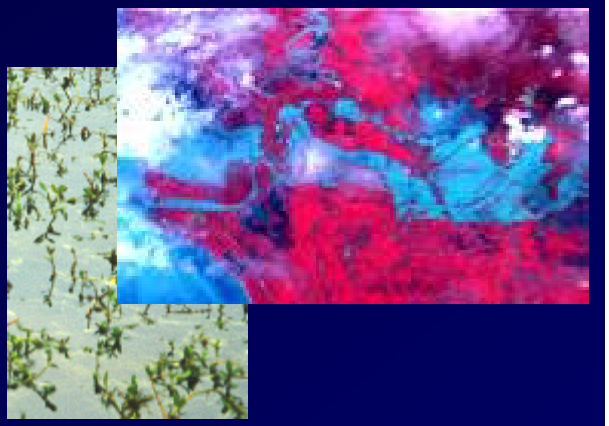
ENVIRONMENTAL HEALTH

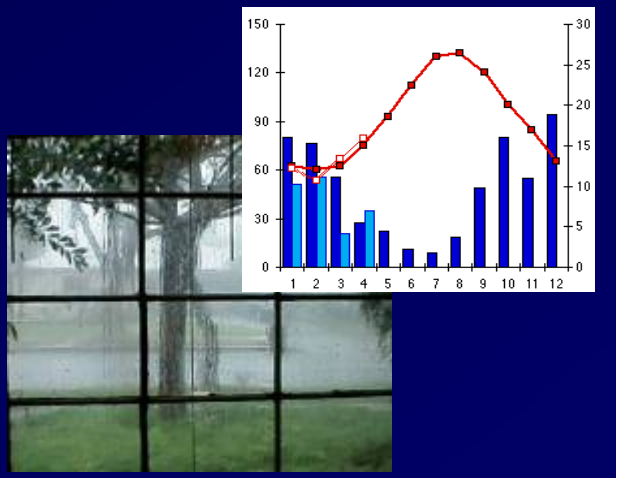
Vegetation/Forest



Remote sensing and spatial analysis (GIS) are used in identifying environmental factors such as temperature, precipitation, vegetation, and landuse patterns affecting public health and occurrences of epidemic diseases.

Surface water/flood



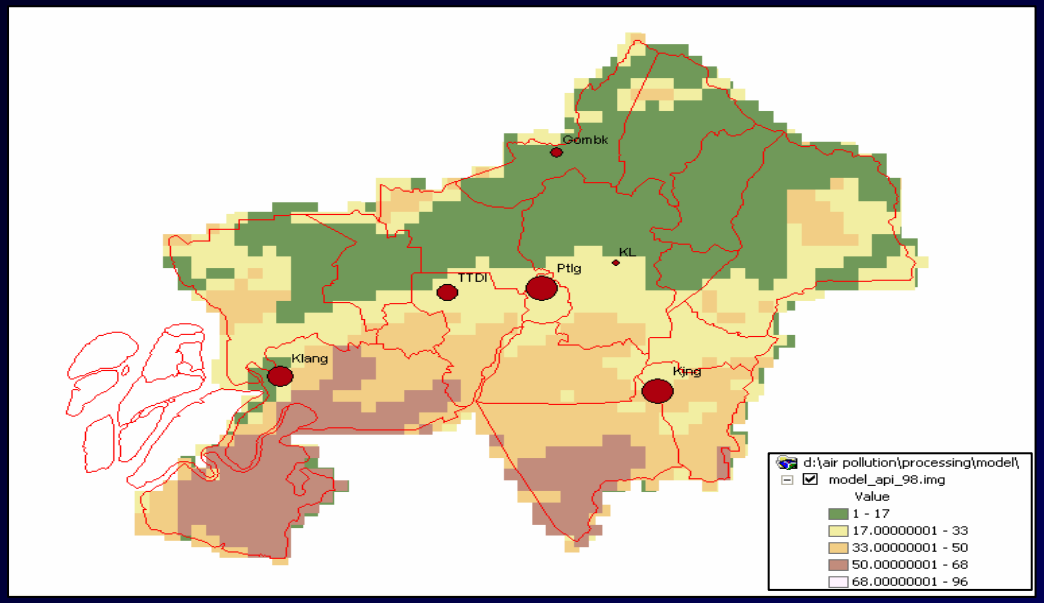


Climate (Temperature, Humidity, Rainfall)

Soil Moisture

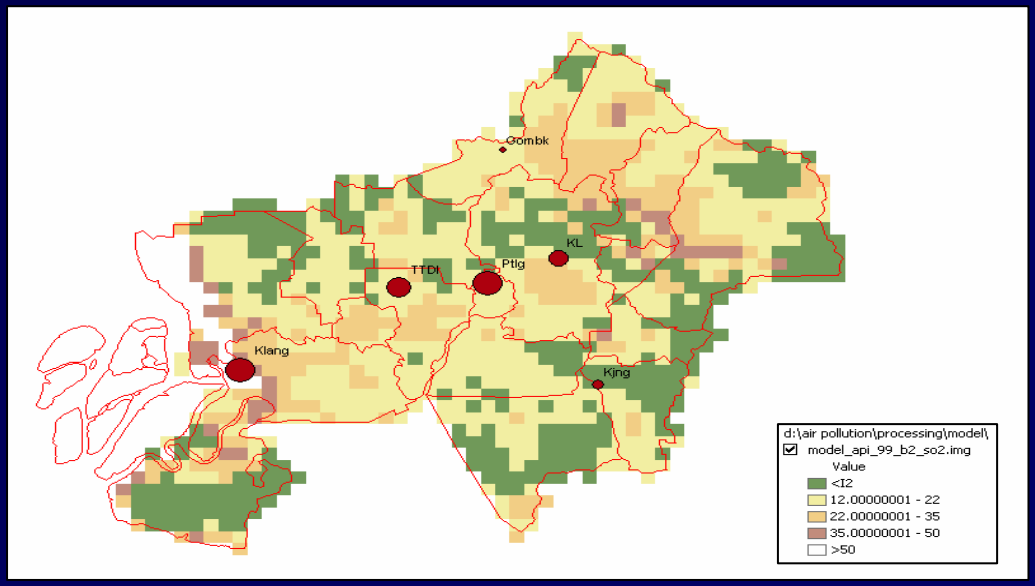
Air Quality

HAZE INTENSITY MAP OF SO2 USING BAND 1 OF NOAA AVHRR DATA IN KLANG VALLEY

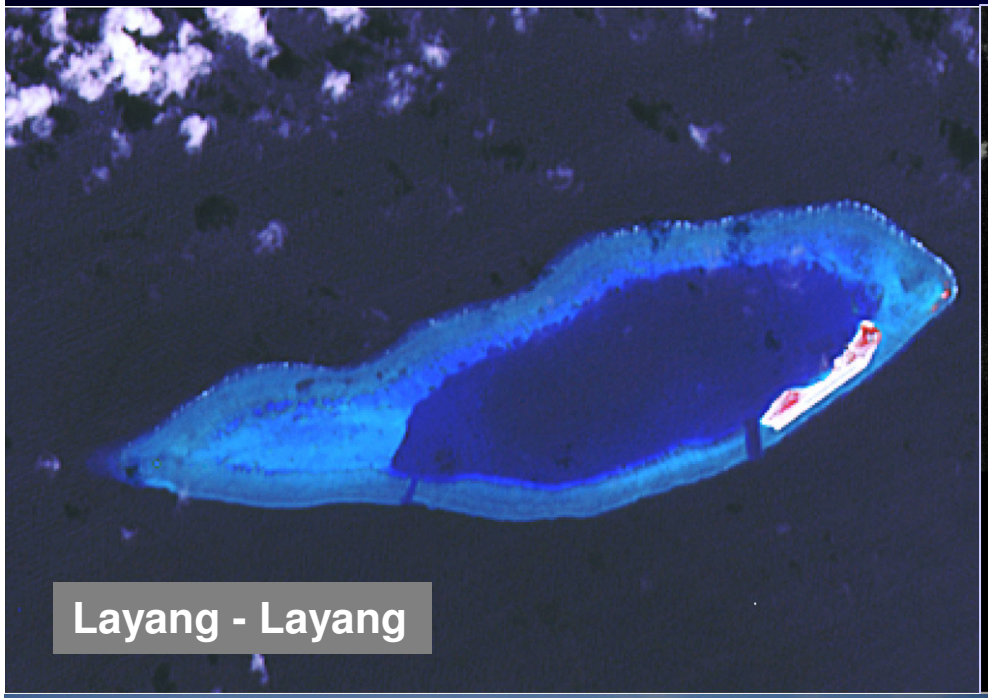


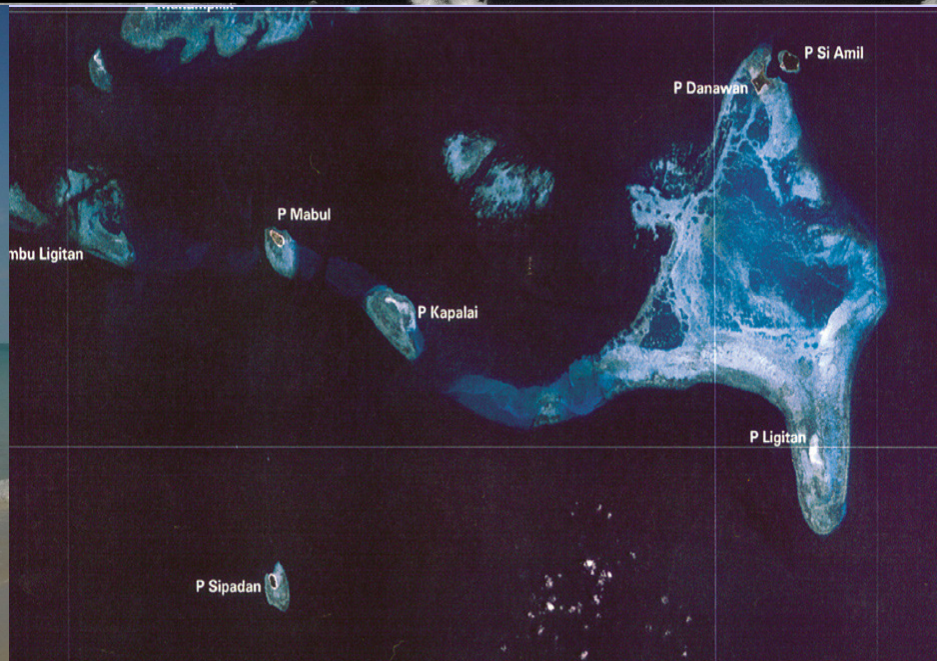
(3 NOVEMBER 1999)

(2 SEPTEMBER 1998)



INTEGRATED ISLANDS MONITORING





Malaysian Remote Sensing Agency (REMOTE SENSING MALAYSIA)
Ministry of Science, Technology and Innovation (MOSTI)
http://www.remotesensing.gov.my *Tel: 603-26973400* *Fax; 603-26973350*

CONCLUSION

REMOTE SENSING AND GIS TECHNOLOGY BECOME MORE RELEVENT NOWADAYS

THE INVESMENT IN THIS TECHNOLOGY IS VERY HIGH

TARGET TO OPTIMISE THE USED OF REMOTE SENSING DATA TO USER AGENCIES AND BENEFIT TO THE POPULATION IN MY COUNTRY

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THANK YOU

Website http://www.remotesensing.gov.my