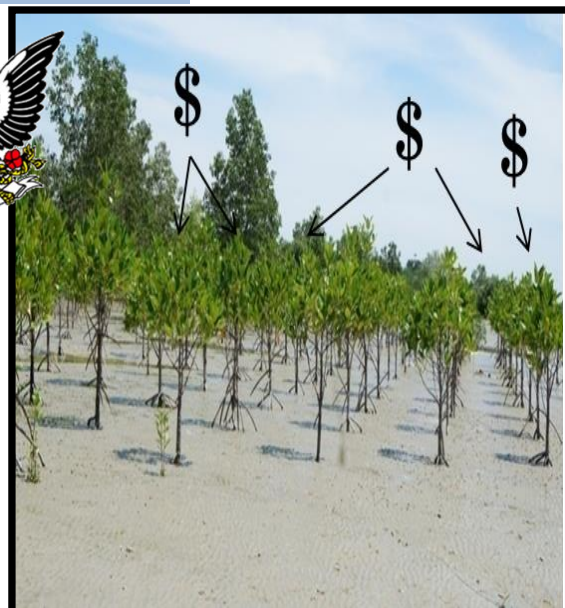
SAFEGUARDING THE SOCIAL AND ECONOMIC IMPORTANCE OF FOREST RESOURCES

Applications of Advance Technology

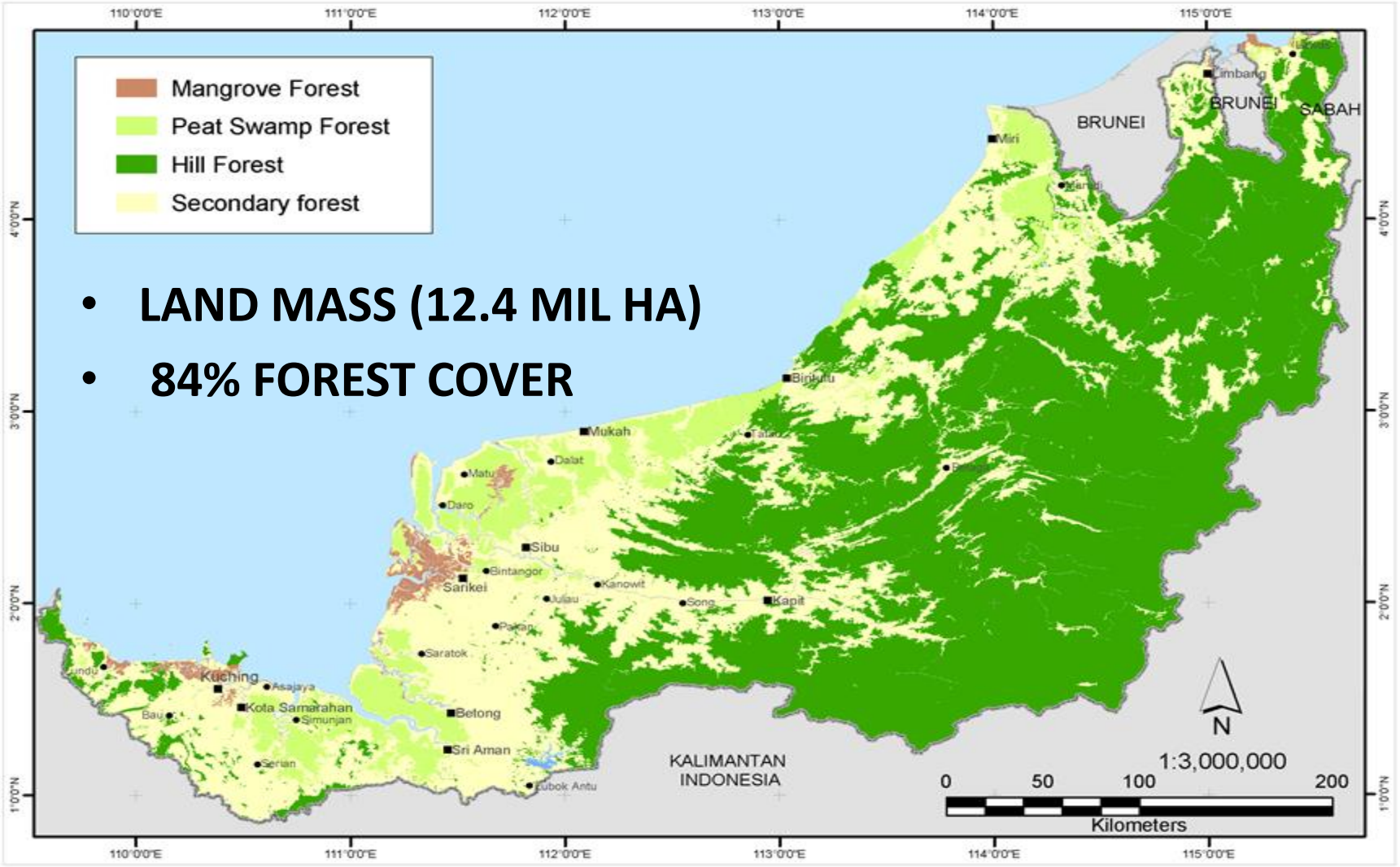


FORESTRY IN MALAYSIA

- Forest Cover: 21 mil Ha (63%)
- Changes in Forest Cover:
  - Deforestation (1990-2005): -140,000 Ha
  - Rate of deforestation (1990-2005): -6.64%

Source: FAO (2005)

FORESTRY IN SARAWAK

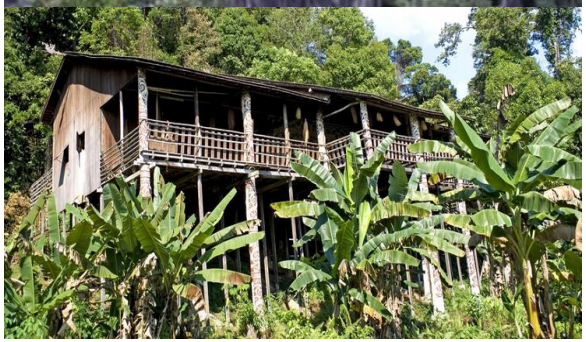


ECONOMIC IMPORTANCE OF FORESTRY SECTOR

- **Government revenue**
  - Royalty: RM 600-700 million
  - Foreign exchange: RM 6 billion
- **Employment**
  - DIRECT (~ 80,000)
    - Logging Industry, Downstream Processing & Manufacturing
  - INDIRECT
    - Service & manufacturing industry

SOCIAL IMPORTANCE OF FORESTRY

- Local Communities
  - Source of livelihood
    - Forest produce, source of water, food (animal & fish)
  - Traditional practices
    - Nomadic (Penan)
    - Farming (other indigenous communities)
  - Ecosystem services
    - Recreation
    - Quality of environment



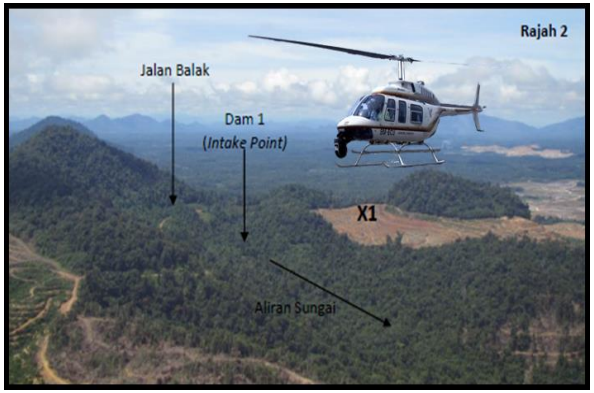
SOCIAL IMPORTANCE OF FORESTRY

- International Agenda
  - **Carbon sink**
    - Tropical forests
      (high carbon intake)
  - **Mitigate climate change**
    - Surface runoff (flood)
    - Sequester carbon
      (depleting ozone layer)

HOW TO ENSURE SUSTAINABILITY

- Sound forest management practices
  - Policy
  - Operations
  - Monitoring*
    - Valuing present worth of timber stand
      - Forest inventory
      - Carbon stocks
    - Ensure targets are achieved
      - (reforestation efforts)
    - Curb illegal activities
      - Encroachment in TPA
      - Management offences

      (not adhering to prescribed standards)



ADVANCE TECHNOLOGY FOR FOREST MONITORING

- Sarawak experience in hyperspectral sensing operations:

  - Tasks

✓Resource monitoring & inventory

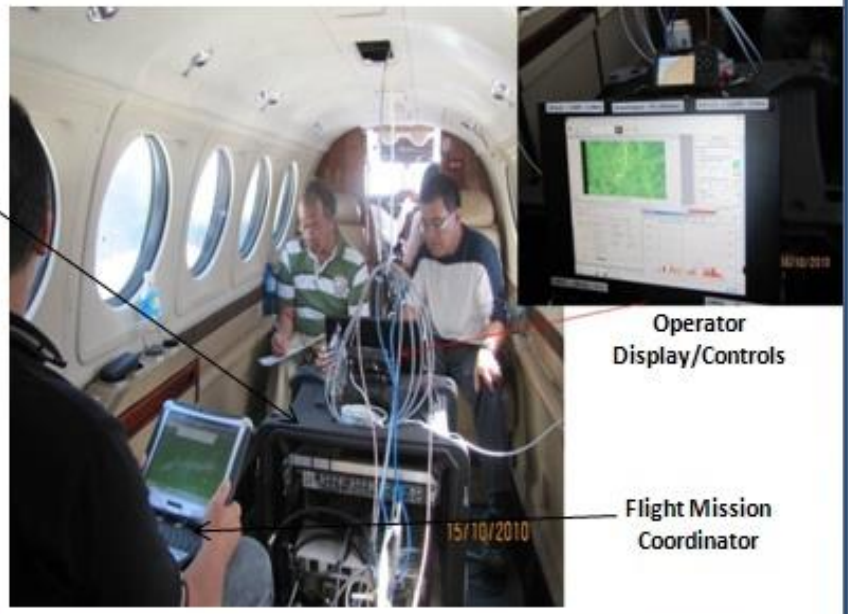
✓Aerial surveillance & enforcement

  - Airborne system

✓ Fixed wing (large area mapping)

✓ Helicopter (enforcement)

AERIAL SURVEILLANCE AND ENFORCEMENT
(AIRBORNE HYPERSPECTRAL IMAGING SYSTEM– AHIS)

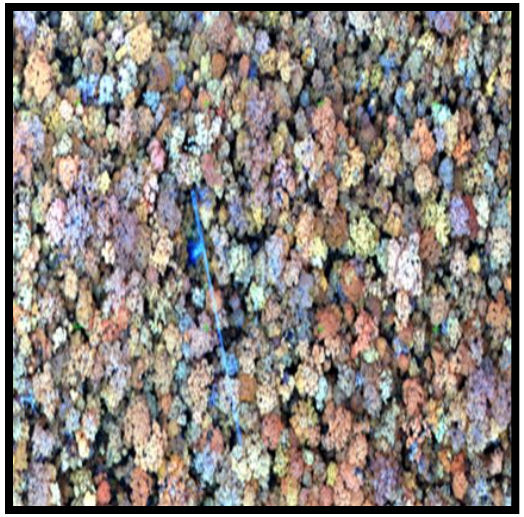


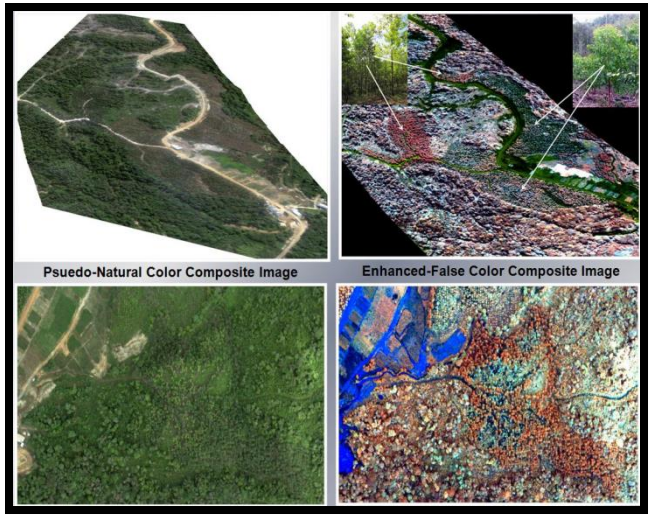
Airborne Platform (KingAir Beechcraft)

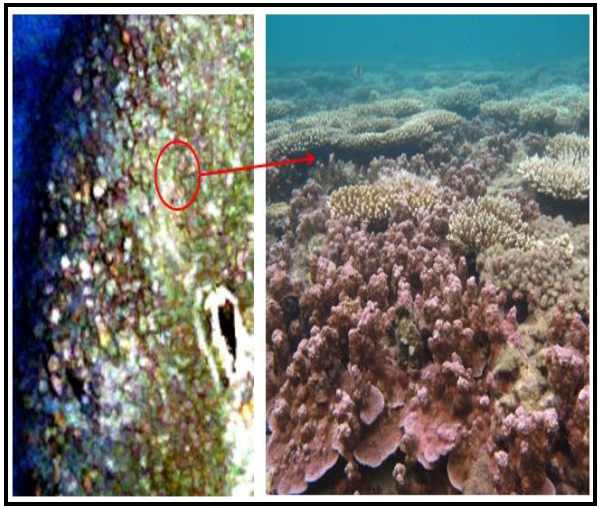
AERIAL SURVEILLANCE AND ENFORCEMENT

(COMPACT AIRBORNE TACTICAL SYSTEM – CATS)

FUNDING FROM FEDERAL GOVERNMENT UNDER 10TH MALAYSIA DEVELOPMENT PLAN



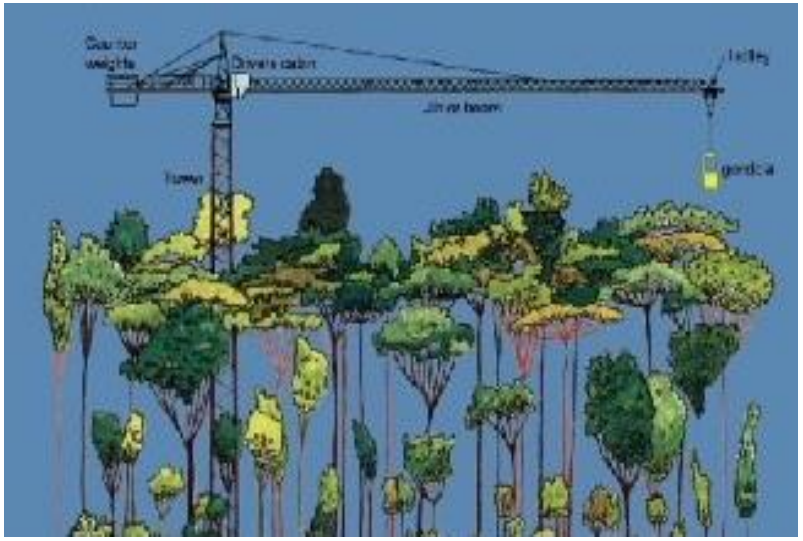


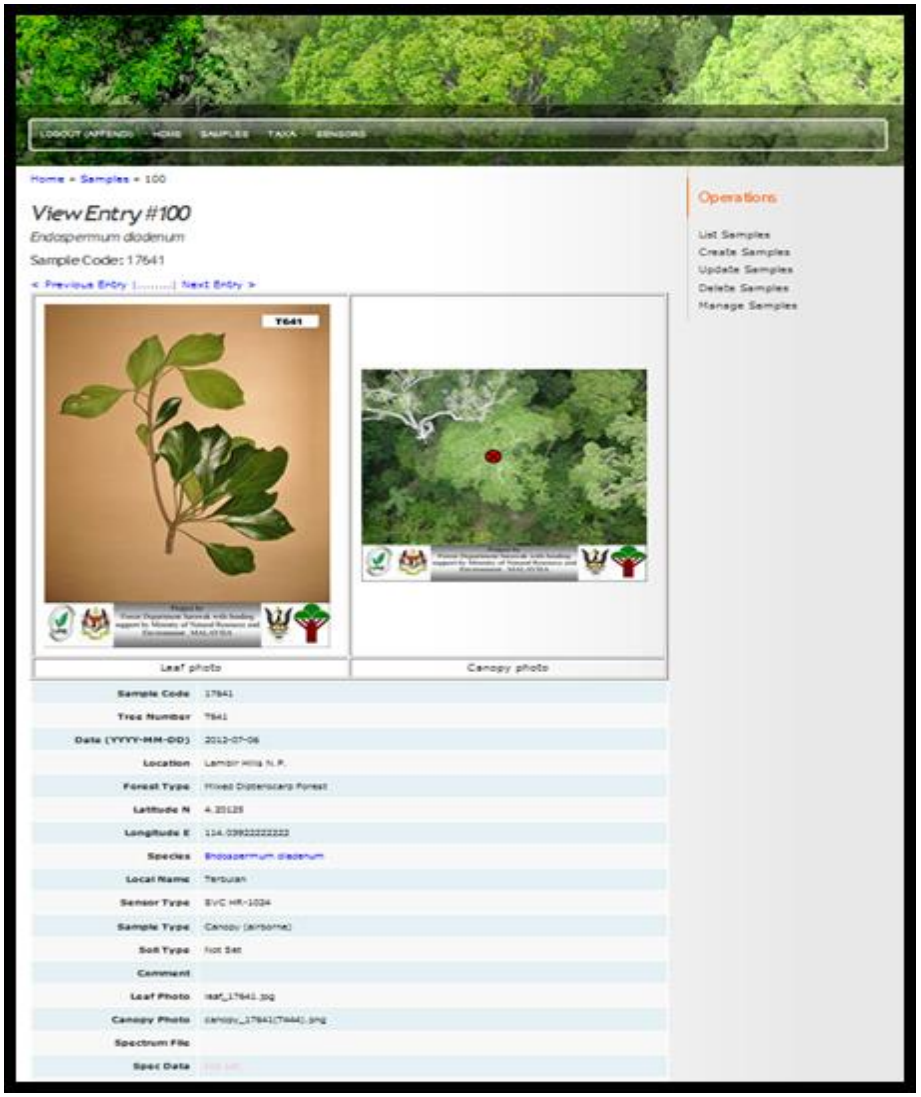


Development of applications

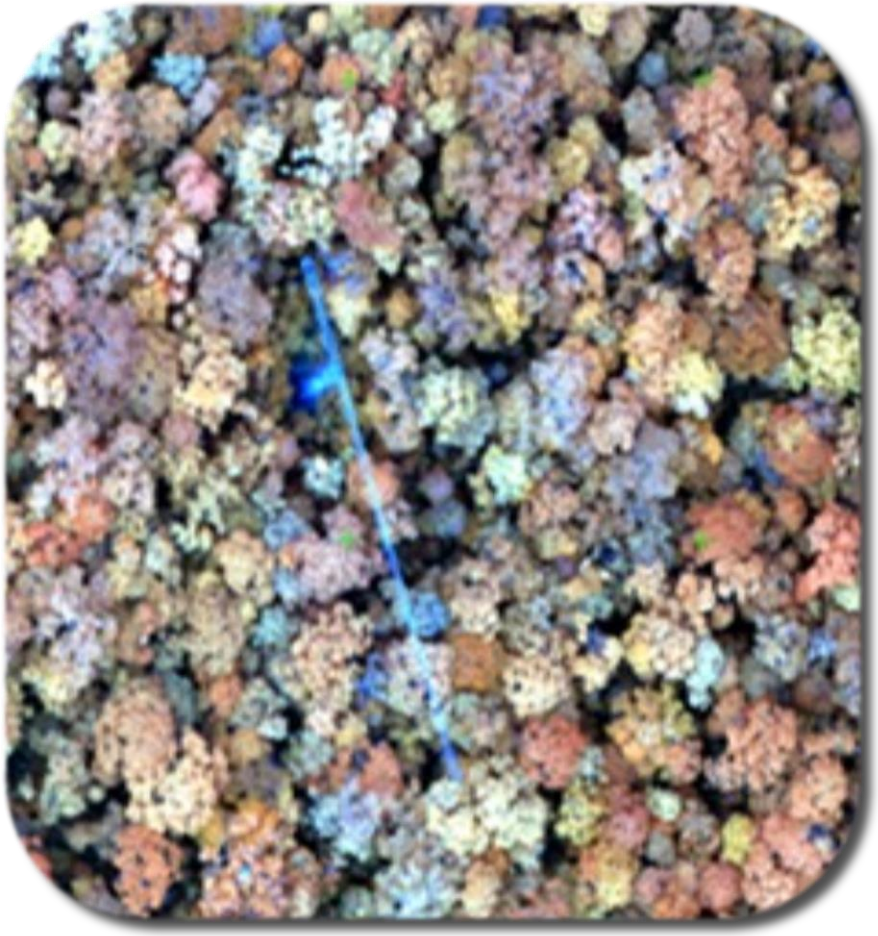
…application development related to forestry operation and natural resource monitoring (P23 0990000 7003 & P23 0990000 7004)

SPECTRAL DATABASE OF MIXED DIPTEROCARP FORESTS





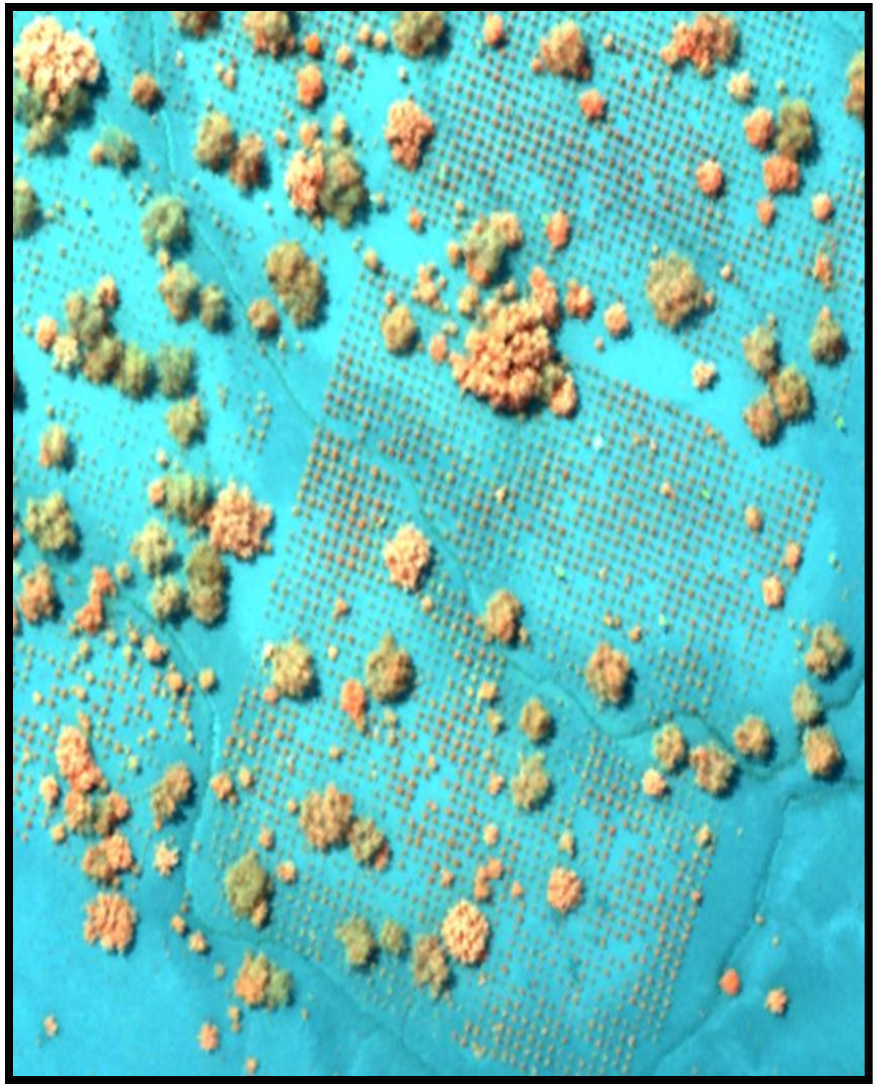
SPECTRAL DATABASE OF MIXED DIPTEROCARP FORESTS

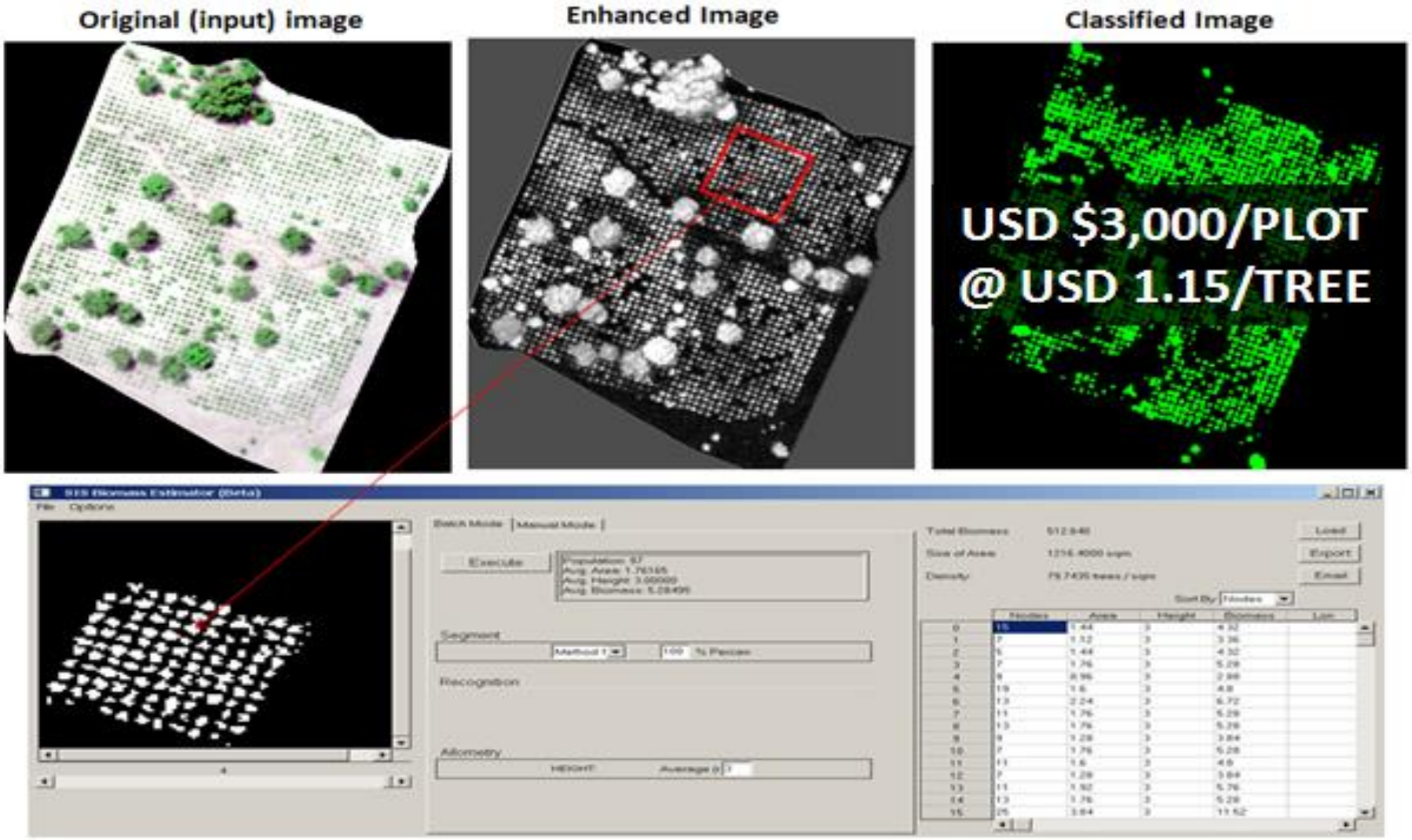


International collaboration with Stamford University (Carnegie Airborne Observatory) and Center of Tropical Forest Science to establish a spectral database of common tree species (canopy and emergent) in the mixed Dipterocarp forests of Sarawak.

TRANSLATING EFFORTS IN MANGROVE PLANTING PROJECTS INTO TANGIBLE VALUE

(CARBON PROJECTS & REDD+)

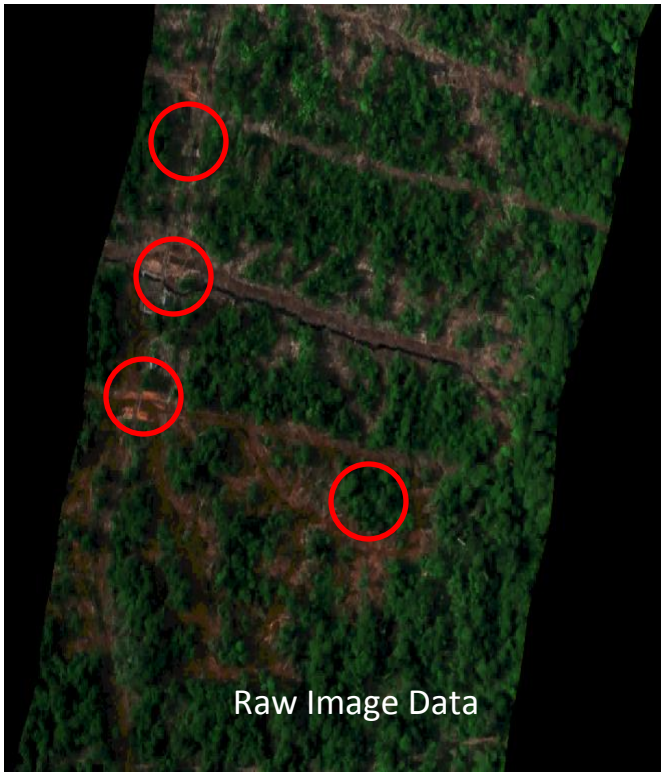


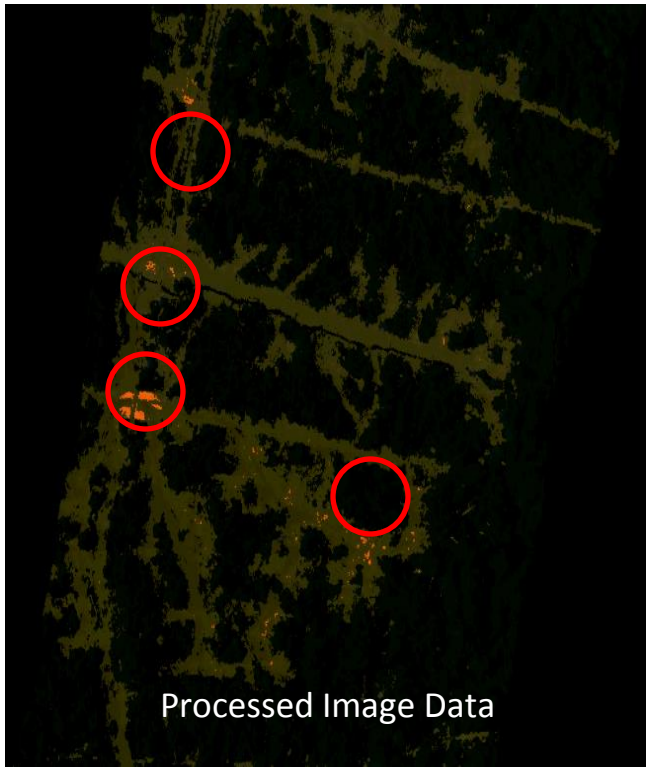


Biomass & Carbon Estimation Tool (under review)

…software application to automate the processing of airborne hyperspectral data for estimating biomass and carbon stock that would then generate the value (carbon credits) of each individual stem at juvenile stage.

APPLICATION DEVELOPED FOR MONITORING ILLEGAL LOGGING





ATTRIBUTES

Clearings

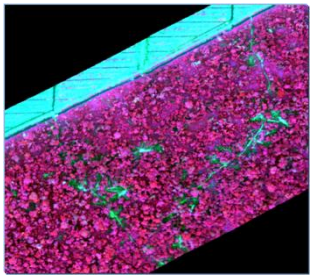
Timber

Forest Clearing Tool

Software program to analyze hyperspectral data for detecting timbers/logs and mapping clearings attributed to illegal logging activities

TRANSLATING RESEARCH TO REAL WORLD APPLICATION

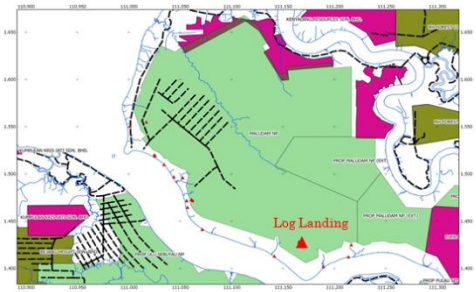
(1)



Surveillance Report

Query/Feedback

(2)



GIS
License Status/ PEC

ADMINSTRATOR

Field Investigation Request

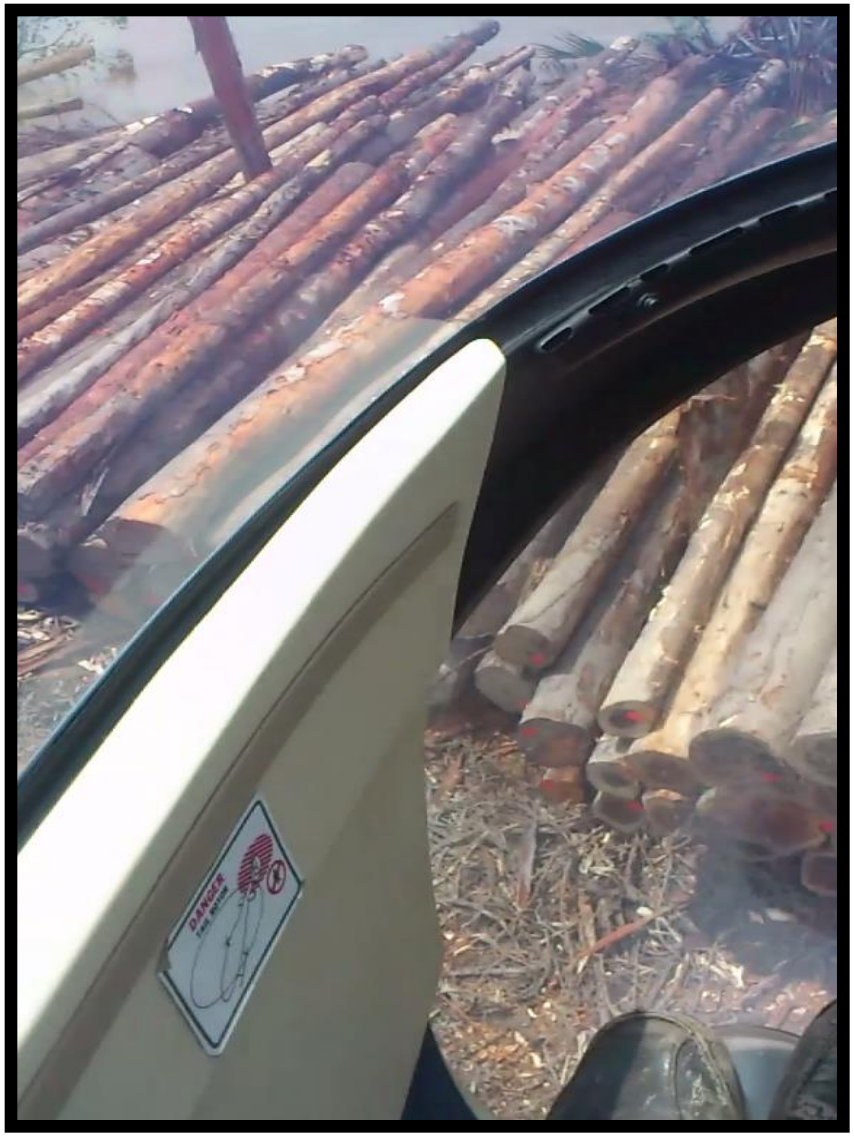
Field Trekker

Disseminate Tactical Info

Disseminate Tactical Info

Protection & Enforcement Field Personnel

TRANSLATING RESEARCH TO REAL WORLD APPLICATION



CHOICE OF PLATFORM

Manned (piloted) aircraft

Optionally piloted aircraft

Unmanned aircraft (drones/uav)

CHOICE OF PLATFORM

- Costs
  - Acquisition
  - Operations & maintenance
- Availability of aircraft
  - Shared facility
- Payload capacity
  - Type of sensor (information derived)
- Operational requirements
  - Approval/permits
  - Airspace/Data integrity

MANNED AIRCRAFT (Fixed Wing/Helicopter)

SYSTEMS APPLICATION AND DEVELOPMENT UNIT

- Large area of coverage (2000-5000 hectares/day)

*weather dependent

- Operational costs (RM3500-7000/hour)

-DCA approval sensor installation (3-12 months)

UAV System

MAPPING MANGROVE RESTORATION ACTIVITIES

UAV Operations

DCA REGULATIONS

AIC **MALAYSIA**

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AFTN : WMKKYAYS
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KUALA LUMPUR

AERONAUTICAL INFORMATION SERVICES
DEPARTMENT OF CIVIL AVIATION
LEVEL 1-4, PODIUM BLOCK,
NO. 27, PERSIARAN PERDANA,
PRECINCT 4,
62618 PUTRAJAYA
MALAYSIA

04 / 2008
18 FEB

UNMANNED AERIAL VEHICLE (UAV) OPERATIONS IN MALAYSIAN AIRSPACE

Small Aircraft

UAV

- Payload capacity
- Registration (Air Worthiness)
- Operator qualification
- Operations
  - Flight plan (ATC issue notice to airmen)
  - Communications with ATC
  - Airspace (operational time frame/window)

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18 FEB

UNMANNED AERIAL VEHICLE (UAV) OPERATIONS IN MALAYSIAN AIRSPACE

1. **Civil UAV registered in Malaysia must have:**
   - Certificate of Airworthiness (> 20kg MTOW)
   - Permit to fly from DCA
   - Insured to meet liabilities in event of accident
   - Operator (Commander or Pilot) of UAV must hold valid PPL with proficiency in UAV operations.
2. **Exception (small model aircraft for recreational purposes) with following prohibitions:**
   - No fly at controlled air space (high air traffic zone)
   - Operational ceiling < 400ft a.g.l (approval from ATC for higher ceiling)
   - Not allowed to conduct aerial work
3. **UAV Operational requirements:**
   - UAV-p must be able to take immediate active control of aircraft
   - Communications with ATC to report operations

MULTI-PURPOSE (SENSING) PLATFORM

…a turnkey airborne sensing solution that would serve the geospatial needs of various agencies in Malaysia. Key benefit of system is the ability to **obtain multiple key information** at **low operational costs**.

CONCLUSION

1.Forest resources should be safeguarded to ensure benefits would be sustained for future generations.

2.Technological advancement in the field of remote sensing could be utilized by foresters to increase effectiveness of managing forest resources.

3.Match objectives with type of sensing system to derive optimal output.