



MACRES '98

JAPORAN TAHUNAN  
ANNUAL REPORT

# LAPORAN TAHUNAN MACRES / MACRES ANNUAL REPORT 1998

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# **PROFAIL MACRES**

## **MACRES PROFILE**

### **PROFAIL MACRES**

#### **MACRES PROFILE**

#### **VISI / VISION**

Visi MACRES ialah untuk menjadi peneraju dalam bidang remote sensing dan teknologi-teknologi lain yang berkaitan, dan membimbing negara kearah kecemerlangan di peringkat antarabangsa dalam bidang-bidang yang berkaitan.

MACRES's vision is to be a leader in the field of remote sensing and related technologies and to lead the nation to international excellence in these areas.

#### **MISI/ MISSION**

Misi MACRES ialah berusaha supaya negara mencapai tahap berdikari dan kecemerlangan di peringkat antarabangsa dalam bidang remote sensing angkasa dan teknologi-teknologi lain yang berkaitan, serta mengoperasikan penggunaannya untuk pengurusan sumber semulajadi dan alam sekitar, serta perancangan strategik negara dengan lebih berkesan, dan menyokong industri tempatan untuk bersaing dalam pasaran terbuka.

MACRES missions are to attain national self-reliance and international excellence in the field of space remote sensing and related technologies, and to operationalise these technologies for effective natural resources and environmental management, and strategic planning of the nation, and to support the local industry to compete in the open market-place.

#### **OBJEKTIF/OBJECTIVE**

Membangun remote sensing angkasa dan teknologi-teknologi lain yang berkaitan serta mengoperasikan aplikasinya bagi tujuan pengurusan sumber dan alam sekitar, serta perancangan strategik negara.

To develop space remote sensing and related technologies and to operationalise their applications for resource and environmental management, and strategic planning of the country.

#### **PROGRAM UTAMA/ MAJOR PROGRAMMES**

- Program Penyelidikan dan pembangunan  
Research and Development Programme
- Program Operasi  
Operations Programme

## **PROGRAM PENYELIDIKAN DAN PEMBANGUNAN**

- Menjalankan penyelidikan dalam bidang remote sensing angkasa dan teknologi yang berkaitan dalam semua sektor pengurusan sumber dan alam sekitar, serta perancangan strategik.
- Menjalankan penyelidikan analisa ruang dan permodelan dalam prasarana sistem maklumat geografik (GIS)
- Menjalankan penyelidikan untuk pembangunan perkakasan dan perisian bagi segmen-segmen Pengguna, Bumi dan Angkasa teknologi remote sensing dan teknologi-teknologi lain yang berkaitan.
- Menyediakan perkhidmatan perundingan dalam aplikasi dan pembangunan remote sensing angkasa dan teknologi lain yang berkaitan

## **PROGRAM OPERASI**

- Mengurus dan mengoperasikan pusat perkhidmatan data remote sensing dan perkhidmatan-perkhidmatan lain yang disediakan oleh MACRES untuk pengguna
- Mengurus dan menyelenggara sistem perkakasan dan perisian dalaman
- Merancang dan mengurus program pembangunan tenaga manusia dalaman
- Merancang dan melaksanakan program pengkorporatan MACRES
- Mengoperasi dan menguruskan stesen penerima bumi satelit remote sensing
- Mengoperasi dan menguruskan pusat maklumat remote sensing nasional

## **RESEARCH AND DEVELOPMENT PROGRAMME**

- Conduct research on application of space remote sensing and related technologies in all sectors of resources and environmental management, and strategic planning.
- Conduct research in spatial analysis and modelling in geographic information system (GIS) environment
- Conduct research for the development of hardware and software in User, Ground and Space Segments of remote sensing and related technologies
- Provide consulting and advisory services on applications and development of space remote sensing and related technologies

## **OPERATIONS PROGRAMME**

- Operate and manage user service centre for remotely sensed data and other services offered by MACRES to its clients.
- Manage and maintain in-house hardware and software systems
- Plan and implement in-house human resources development programme.
- Plan and implement MACRES corporatisation programme
- Operate and manage satellite remote sensing ground receiving station
- Operate and manage a national remote sensing information centre

## KUMPULAN PENGURUSAN MACRES/MACRES MANAGEMENT TEAM



- Duduk dari kiri : En.Ab. Rahim Hj. Saleh (Timb. Pengarah (Operasi)/**Deputy Director (Operations)**)  
**Seated from left:** En. Nik Nasruddin Mahmood, FRSS (Pengarah MACRES/**Director of MACRES**)  
En. Loh Kok Fook (Timb. Pengarah (Penyelidikan & Pembangunan)/**Deputy Director (Research & Development)**)
- Berdiri dari kiri: Cik Azmah Ali (Ketua(Memangku) , Bhg.Pembangunan Perkakasan/**Head(Acting), Hardware Development Div.**)  
**Standing from left**: En.Mohd. Sam Manaf (Ketua(Memangku) , Bhg.Pembangunan Perisian/  
**Head(Acting), Software Development Div.**)  
En. Darus Ahmad (Ketua I, Bhg. Data & Informasi/**Head I, Data & Information Div.**)  
Pn. Nik Mazlina Nik Mustaffa (Ketua II (Memangku), Bhg. Data & Informasi/**Head II (Acting), Data & Information Div.**)  
Cik Mardiana Shafiee (Ketua, Bhg. Perancangan/**Head, Planning Div.**)  
En. Jimat Bolhassan (Ketua, Bhg.Analisis Data Spatial/**Head, SpatialData Analysis Div.**)  
En. Mansor Abdul Rahaman (Ketua, Bhg. Sistem & Konfigurasi/**Head, System & Configuration**)  
En. Soo Soong Kwan (Ketua, Bhg. Penerimaan Data/**Head, Data Reception Div.**)  
Pn. Salmah Kassim (Ketua (Memangku), Bhg. Korporat/**Head(Acting) Corporate Div.**)

# Aktiviti Korporat

## Corporate Activities

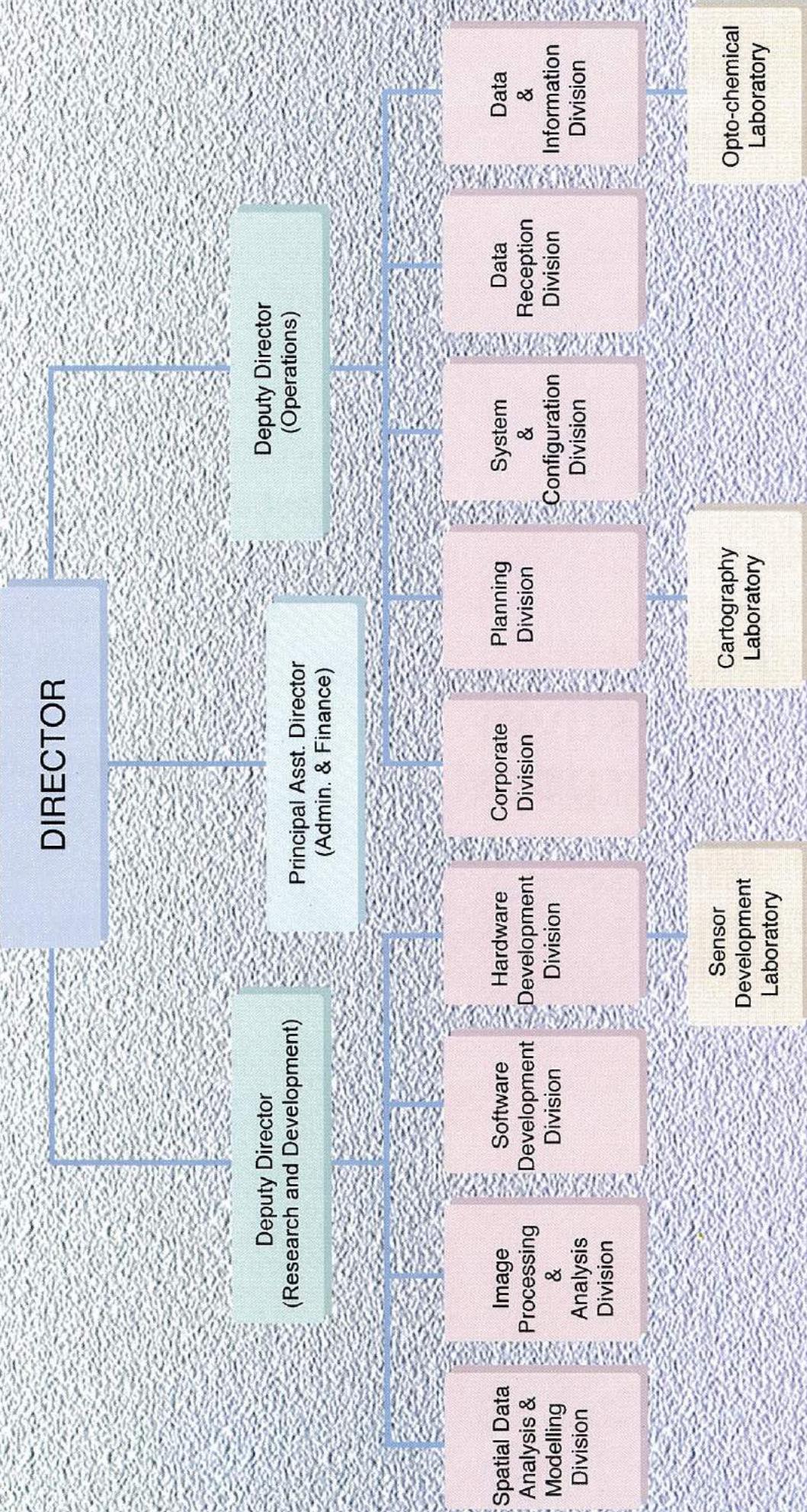
Khidmat Data & Maklumat  
Data & Information Services

Khidmat Perundingan  
Consultancy Services

Khidmat Latihan  
Training Services

Penyelidikan Kontrak  
Contract Research

# CARTA ORGANISASI MACRES MACRES ORGANISATION



## *PERUTUSAN PENGARAH DIRECTOR'S STATEMENT*



Pengarah MACRES  
Director MACRES

MACRES telah dengan jayanya melaksanakan Program Remote Sensing Nasional sebagai satu komponen dalam aktiviti pembangunan teknologi angkasa negara dalam tahun 1988. Dalam jangkamasa tersebut beberapa matlamat yang disasarkan telah dapat dicapai walaupun terdapat beberapa halangan yang tidak dapat dielakkan.

Tahun 1998 telah menampilkan banyak cabaran-cabaran baru yang perlu MACRES hadapi, terutamanya apabila MACRES turut menerima kesan dari masalah kegawatan ekonomi yang dihadapi oleh negara. Purata peruntukan kewangan yang diluluskan oleh pihak Kementerian telah dikurangkan sebanyak 20%. Dengan itu, beberapa projek dan aktiviti MACRES terpaksa ditangguhkan bagi memberi laluan kepada pencapaian matlamat projek-projek yang lebih penting dalam tahun ini.

Untuk projek penyelidikan dan pembangunan, MACRES masih meneruskan projek-projek utama di bawah perlaksanaan Rancangan Malaysia Ke-7. Ini merangkumi Program NAREM (Natural Resources and Environmental Management) dan SIM (Satellite Image Map) di mana negeri Selangor dijadikan sebagai kawasan projek perintis. Projek NAREM adalah bertujuan untuk membangunkan sistem maklumat data spatial untuk pengurusan sumber asli berdasarkan data satelit remote sensing. Tumpuan adalah diberikan kepada sektor pertanian, perhutanan, geologi, alam sekitar, zon pantai, ekonomi sosial, marin dan topografi.

MACRES successfully implemented the National Remote Sensing Programme as a component of the national space technology development in 1998. Despite experiencing some unforeseen shortcomings, it has satisfactorily achieved objectives of programmes and activities planned for implementation in the year.

1998 was full with new challenges that need to be addressed by MACRES, in particular the effect of economic crisis which lead to the overall reduction of governmental expenditure by 20%. MACRES therefore made the necessary adjustments to channel its financial resources towards achieving high performance for projects of higher priority.

In implementing its R&D programme, MACRES continued to give emphasis on implementation of its major RM7 projects namely NAREM (National Resources and Environmental Management) and SIM (Satellite Image Map) in Selangor State, which is the pilot project area. NAREM Programme is aimed to develop a spatial data information database for the management of natural resources based on remote sensing satellite data. Focus is given to agriculture, forestry, geology, environment, coastal zones, social economics, marine and topography.

Lima pakar dari luar negara dan lapan pakar tempatan telah bersama-sama membantu MACRES melaksanakan projek dalam tahun ini. Bagi projek SIM pula, tahun 1998 telah memberikan beberapa hasil yang menggalakkan di mana projek ini telah menghasilkan satu pangkalan data hidrografi, kontor dan sempadan pentadbiran seluruh Selangor, lembar *Digital Terrain Model*, produk berdigit dan beberapa *ground control points*.

Tiga projek IRPA yang baru telah dilaksanakan tahun ini disamping menyambung pelaksanaan program AIRSAR PACRIM dan projek *Land Use/Cover Mapping Using Radar Data* yang telah dimulakan pada tahun 1997.

Sementara itu, MACRES turut memberi sokongan dalam usaha kerajaan menangani masalah kebakaran hutan yang menyebabkan keadaan jerebu di dalam negara. Di bawah usaha yang diterajui oleh Biro Keselamatan Negara ini, MACRES telah membangunkan Pelan Keseluruhan Pengurusan Kebakaran Hutan yang merangkumi sistem amaran awal berdasarkan penggunaan data satelit NOAA dan SPOT. Pelan ini telah digunakan dengan sepenuhnya bagi pengurusan kebakaran hutan dan pengesanan jerebu di kedua-dua peringkat nasional dan serantau. MACRES juga menggunakan data remote sensing secara intensif dalam pemantauan aktiviti di kawasan-kawasan yang dilindungi seperti kawasan tадahan air dan hutan simpanan.

MACRES masih meneruskan program pembangunan tenaga manusianya sebagai langkah utama untuk mencapai tahap berdikari dalam bidang teknologi-teknologi remote sensing dan yang berkaitan di negara ini. Masalah kegawatan ekonomi telah memberi kesan kepada program ini di mana usaha menghantar pegawai ke luar negara untuk melanjutkan pelajaran di peringkat sarjana tidak dapat dilaksanakan.

Five foreign and eight local experts were engaged to assist MACRES in this year's project implementation. As for the SIM project, 1998 has produced a number of encouraging outputs - one of which is the development of a database for hydrography, contour and administrative boundaries for Selangor, digital terrain model, digital products and establishment of ground control points.

Three new IRPA projects were initiated in addition to the implementation of existing AIRSAR PACRIM programme and Land Use/Cover Mapping Using Radar Data project which began in 1997.

MACRES also supported the Government in its efforts to manage forest fires which had caused haze hazards in the country recently. This has lead to the development of a Total Forest Fire Management Plan which encompassed an early warning system based on the usage of NOAA and SPOT satellite data. The plan has been utilised in managing forest fires and detection of haze at both national and regional level. MACRES is also intensively utilising remote sensing data in the monitoring of activities in the environmentally protected areas such as water catchment and forest reserve areas.

MACRES also continued its human resource development programme in its effort to attain self-reliance in remote sensing and related technologies in the country. The economic crisis experienced by the country had its impact on this programme where candidates could not be sent for overseas postgraduate courses.

MACRES juga mengalami kesukaran mengisi 18 jawatan pegawai penyelidik kerana ketiadaan calon-calon yang sesuai. Keadaan ini telah menjelaskan keberkesanan pelaksanaan program-program di MACRES dalam tahun 1998.

Dalam pembangunan infrastruktur, kerja-kerja pembinaan komponen bangunan stesen penerima bumi remote sensing telah dimulakan pada bulan November. Sementara itu, MACRES juga terlibat dalam penyediaan dokumen tender komponen sistem stesen berkenaan yang dijangka akan ditender semula oleh Perbendaharaan dalam tahun 1999. Sementara itu pembinaan pejabat baru MACRES telah mengalami kelewatan kerana kesan kegawatan ekonomi yang dialami negara.

Berbekalkan pengalaman daripada cabaran yang dihadapi tahun 1998, MACRES akan terus meningkatkan usaha pembangunan tenaga manusia dan infrastruktur yang diperlukan bagi mengoperasikan teknologi remote sensing dan teknologi-teknologi yang berkaitan bagi tujuan pembangunan negara.

MACRES also experienced difficulties in the recruitment of its 18 vacant research officers posts due to the lack of suitable candidates. This had also adversely effected the implementation of MACRES operation and R&D programmes in 1998.

For infrastructure development, the construction of the remote sensing ground receiving station building component was initiated in November. MACRES was also involved in preparation of tender documents for the station system component that was scheduled for retender in 1999. On the other hand, construction of MACRES headquarters building was delayed as a consequence to the economic slow down experienced by the country.

With the 1998 experiences, MACRES will continue its efforts in developing human resources and infrastructure needed for the operationalisation of remote sensing for national development.



(NIK NASRUDDIN MAHMOOD, FRSS)  
Pengarah MACRES  
Director of MACRES

**OBJEKTIF DAN STRATEGI MACRES 1998**  
**MACRES OBJECTIVES AND STRATEGIES FOR 1998**

## Objektif

Sebagai sebuah agensi yang sedang berkembang dan bertanggungjawab terhadap pembangunan dan pengoperasian satu bidang teknologi tinggi yang dinamik, objektif MACRES dalam tahun 1998 masih ditumpukan kepada pelaksanaan aktiviti-aktiviti pembangunan kapasiti yang melibatkan sumber manusia, infrastruktur dan peralatan; projek-projek penyelidikan dan pembangunan (P&P); dan aktiviti-aktiviti untuk memperkembangkan penggunaan teknologi remote sensing di negara ini.

### Strategi Pembangunan Kapasiti MACRES

- \* Membangun tenaga mahir dan terlatih dalam teknologi remote sensing
- \* Membangun infrastruktur dan memperolehi kelengkapan yang bersesuaian
- \* Meningkatkan aktiviti penyelidikan dan pembangunan bagi menyokong pengoperasian teknologi-teknologi berkaitan
- \* Memperolehi data remote sensing bagi memenuhi keperluan negara
- \* Membantu dan menyokong industri tempatan dalam penggunaan teknologi remote sensing angkasa dan teknologi berkaitan bagi tujuan pembangunan
- \* Melibatkan institut-institut pengajian tinggi dalam pelaksanaan aktiviti MACRES yang tertentu.

## Objectives

As a developing agency entrusted to develop and operationalise a high and dynamic technology, MACRES continued to focus its objectives in 1998 on capacity building activities which involved human resources, infrastructure and instrumentation; research and development projects; and activities to promote wider applications of remote sensing technology in the country.

### MACRES Capacity Building Strategies

- \* Develop skilled and trained manpower in remote sensing technology
- \* Develop and acquire appropriate infrastructures and facilities
- \* Intensify research and development efforts in order to support operationalisation of relevant technologies
- \* Acquire relevant remotely sensed data to meet national requirements
- \* Support participation of local industry on the use of space remote sensing technology and relevant technologies for development
- \* Involves institutes of higher learning in relevant MACRES activities

**URUTAN PERISTIWA PENTING  
BERGAMBAR**  
**IMPORTANT EVENTS IN PHOTOS**



Lawatan delegasi dari Republik Islam Iran  
A visit by a delegation of the Islamic Republic of Iran



Lawatan mengumpul maklumat UNDP mengenai  
aktiviti remote sensing serantau  
A fact finding visit from UNDP on the regional  
remote sensing activities



Hari orientasi kakitangan baru MACRES  
MACRES new staff orientation day



Penyampaian Anugerah Khidmat Cemerlang oleh  
Y.B. Timbalan Menteri Sains, Teknologi dan Alam Sekitar  
Prize Giving Ceremony for High Achieving Staff by  
the Honourable Deputy Minister of Science, Technology and the Environment



Konvensyen KMK Kementerian Sains dan Alam Sekitar  
KMK convention of the Ministry of Science, Technology and the Environment



Lawatan YAB Perdana Menteri Malaysia ke gerai MACRES di Pameran ITEX '98 di Sunway Pyramid

Visit to MACRES booth by the Honourable Prime Minister of Malaysia during ITEX '98 Exhibition at Sunway Pyramid

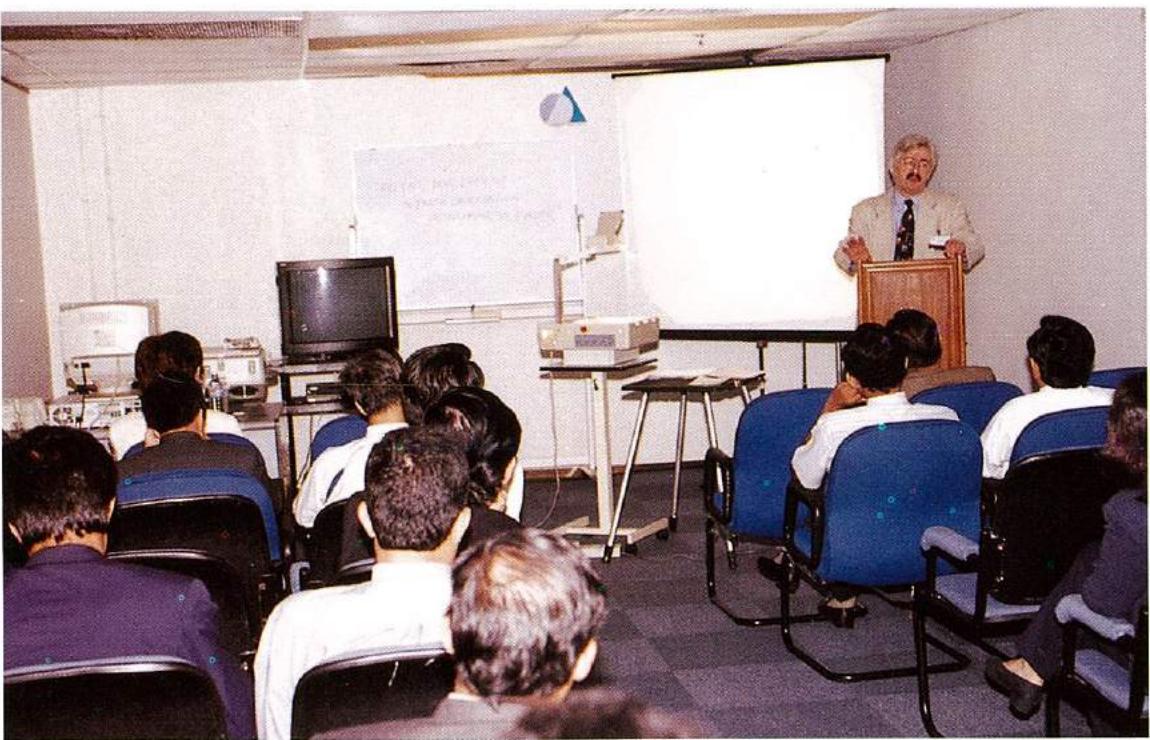


Y.B. Menteri Sains, Teknologi dan Alam Sekitar dan Timbalan Menteri melawat gerai pameran MACRES sempena Hari Quality

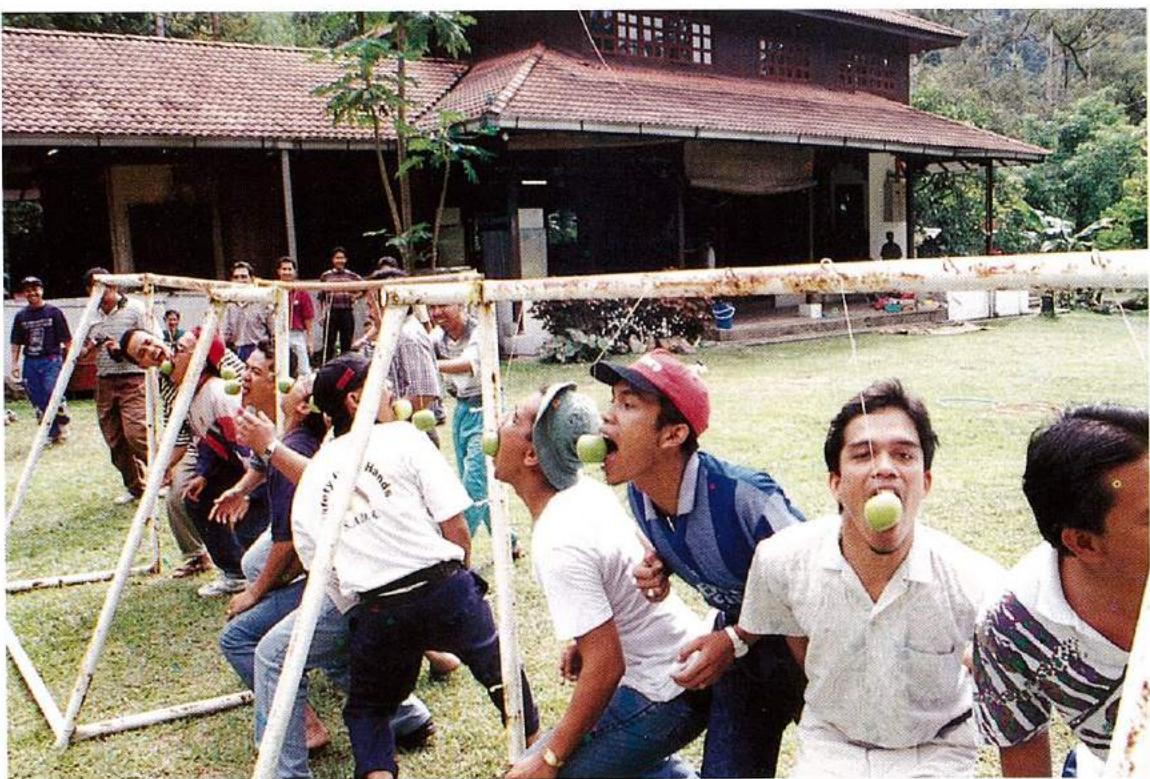
The Honourable Minister of Science, Technology and the Environment and The Honourable Deputy Minister visiting MACRES exhibition booth during Quality Day



Majlis menandatangani Memorandum Persefahaman Antara MACRES dan UNITELE  
The signing of a Memorandum Of Understanding between MACRES and UNITELE



Ceramah CPD (Carrer Path Development) bertajuk "Radarsat in Europe" di MACRES  
CPD talk on "Radarsat in Europe" at MACRES



Hari Keluarga MACRES di Alang Sendayu, Gombak  
MACRES Family Day at Alang Sendayu, Gombak

**PROGRAM PENYELIDIKAN DAN PEMBANGUNAN  
RESEARCH AND DEVELOPMENT PROGRAMME**

Pada tahun 1998, MACRES telah melaksanakan tiga inisiatif utama di bawah program penyelidikan dan pembangunan (P&P), iaitu projek penyelidikan MACRES, penyelidikan IRPA dan penyelidikan kerjasama serantau/ dua-hala.

### **Projek Penyelidikan MACRES**

Dua projek penyelidikan dan pembangunan yang dilaksanakan ialah :-

- \* Pengurusan Sumber dan Alam Sekitar Nasional (NAREM)
- \* Pengeluaran Peta Imej Satelit (SIM)

#### **Pengurusan Sumber dan Alam Sekitar Nasional (NAREM)**

Objektif utama NAREM ialah untuk membangun dan mengoperasikan satu sistem bersepadu pengurusan sumber dan alam sekitar nasional bagi menyokong perancangan pembangunan negara dan juga untuk mengukuhkan pembangunan kapasiti tenaga manusia dalam bidang teknologi-teknologi yang berkaitan.

Negeri Selangor telah dipilih sebagai kawasan perintis bagi tujuan pelaksanaan program ini dalam RM7. Tumpuan telah diberikan kepada pembangunan teknologi dalam sektor pertanian, perhutanan, geologi, alam sekitar, zon pantai, sosial ekonomi, marin dan topografi.

Lima pakar negara luar, iaitu dari Perancis (1), Kanada (2), China (1) dan Vietnam (1) dan lapan pakar tempatan (UTM, UPM, FRIM, UNITELE, MARDI, GSM, NAHRIM dan SEAFDEC) telah membantu MACRES melaksanakan projek-projek di bawah NAREM. Di antara pencapaian penting dalam tahun 1998 termasuklah:-

In 1998, MACRES implemented three major initiatives under its research and development programme (R&D), i.e. MACRES R&D projects, IRPA research projects and regional/bilateral projects.

### **MACRES Research Projects**

Two research and development projects implemented were :-

- \* National Resources and Environmental Management (NAREM) Programme
- \* Satellite Image Map (SIM) production

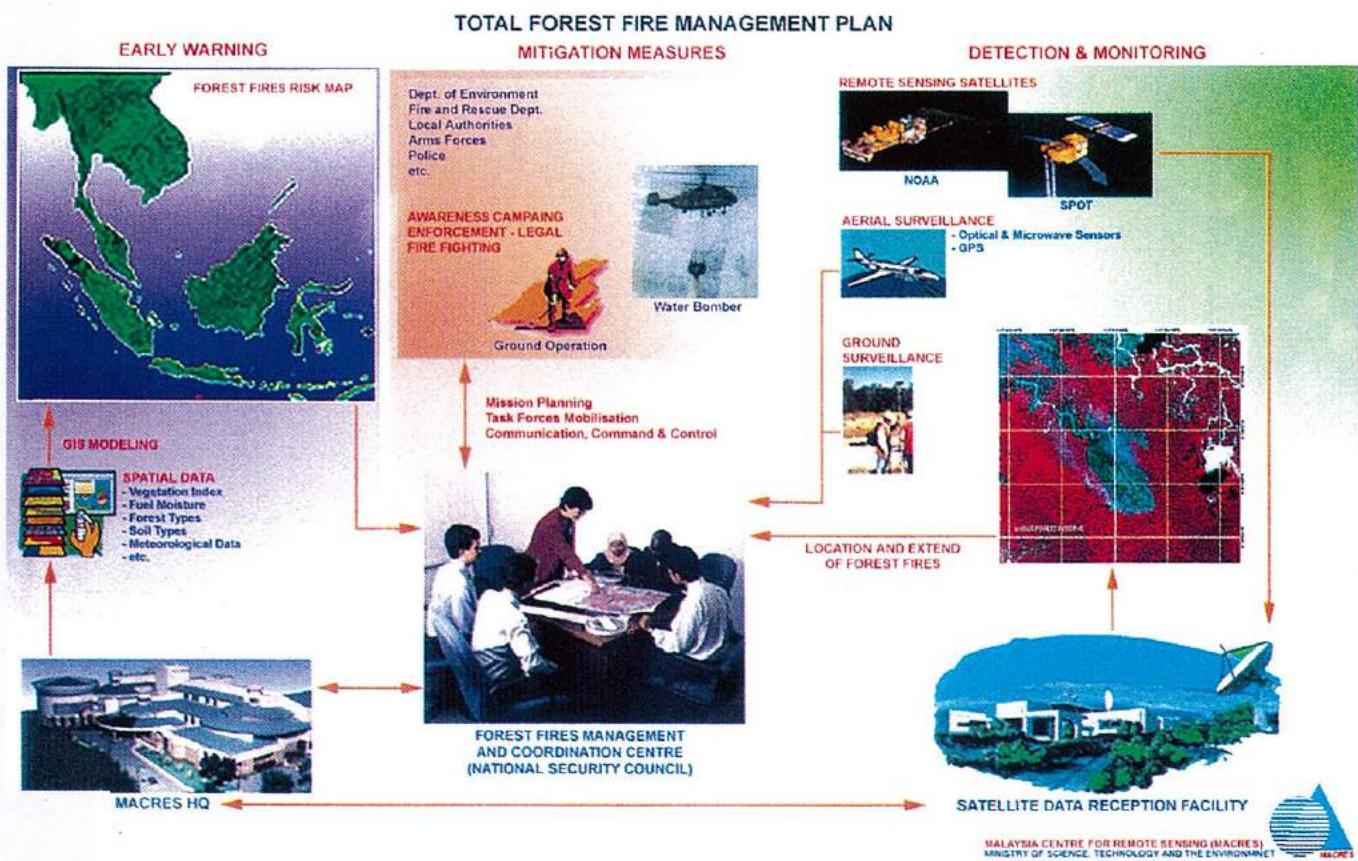
#### **National Resources and Environmental Management (NAREM)**

The major objective of NAREM is to establish and operationalise a system of spatial database on national resources and the environment to support national development planning and also to strengthen capacity building and human resources development in related technologies.

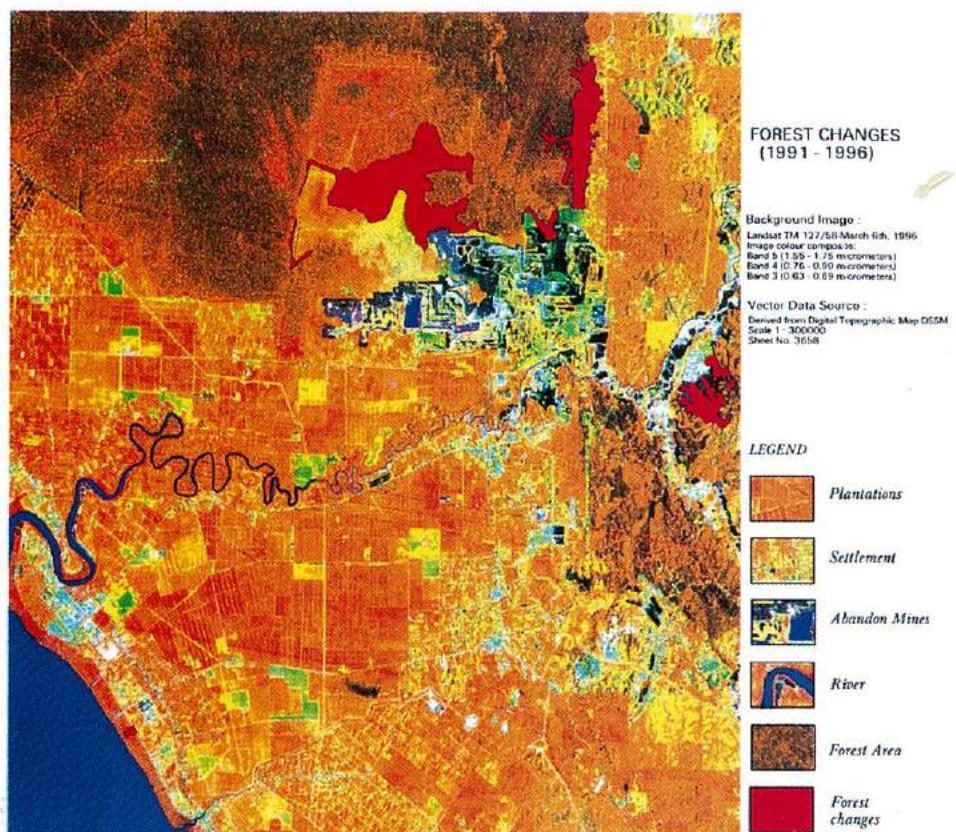
Selangor was chosen as the pilot study site for this programme. Focus was given to technology development in agriculture, forestry, geology, environment, coastal zones, socio economics, marine and topography.

Five foreign experts, i.e. France (1), Canada (2), China (1) and Vietnam (1), and eight local experts (UTM, UPM, FRIM, UNITELE, MARDI, GSM, NAHRIM and SEAFDEC) assisted MACRES to implement various projects under NAREM. Some important achievements in 1998 include :-

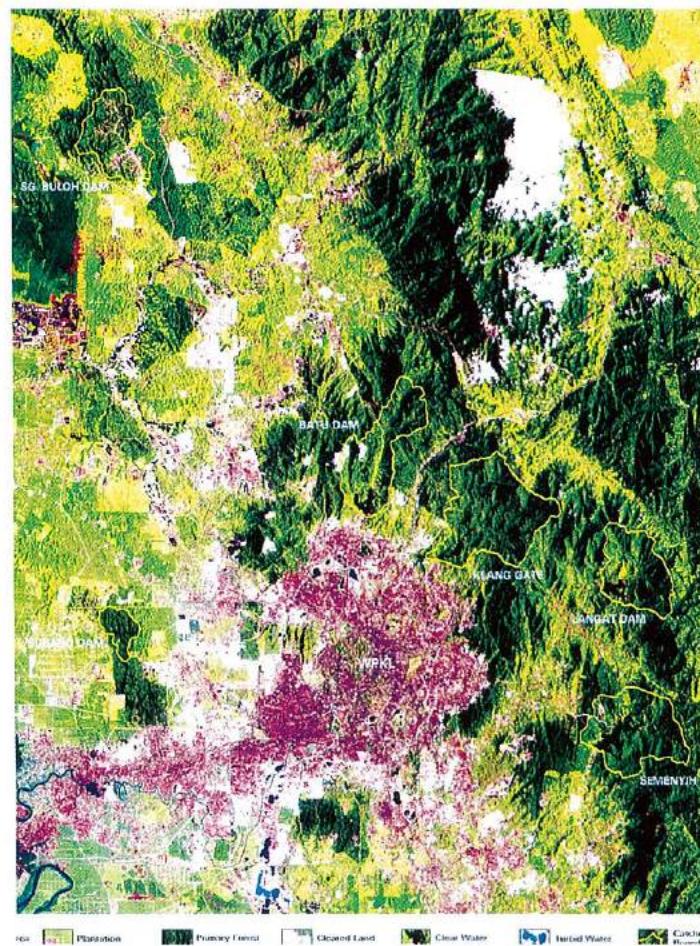
- Pembangunan aplikasi-aplikasi remote sensing dan Sistem Maklumat Geografi (GIS) dalam bidang pengawalseliaan pembakaran hutan(Rajah 1), pengesanan perubahan di hutan (Rajah2) dan pengawalseliaan kawasan tadahan air (Rajah 3).
- Pembangunan pangkalan data dan aplikasi-aplikasi 'decision making' untuk sistem NAREM.
- Remote sensing and Geographical Information System (GIS) application in forest fire monitoring (Figure 1), change detection in forested areas (Figure 2) and management of water catchment (Figure 3).
- Database development and decision making application tools for the NAREM system.



Rajah 1: Pelan Pengurusan Kebakaran Hutan  
Figure 1: Total Forest Fire Management Plan



Rajah 2: Pengesahan perubahan kawasan hutan di Kuala Selangor  
Figure 2: Change detection in forested areas of Kuala Selangor



Rajah 3 : Kawasan Tadahan Hujan Selangor  
Figure 3 : Catchment Areas of Selangor

### Satellite Image Map (SIM)

MACRES telah menandatangani Memorandum Persefahaman dengan Jabatan Ukur dan Pemetaan Negara pada 19 Mac 1998 untuk pelaksanaan bersama projek SIM. Dalam tahun 1998, projek SIM telah menghasilkan pangkalan data hidrografi, kontor dan sempadan pentadbiran bagi seluruh negeri Selangor, 10 lembar *Digital Terrain Model*, 4 lembar produk SIM berdigit dan menujuhan 14 *Ground Control Points*.

### Projek Penyelidikan IRPA

MACRES telah menyambung pelaksanaan kedua-dua program AIRSAR PACRIM dan projek bertajuk *Land Use/Cover Mapping Using Radar Data* yang dimulakan pada tahun 1997. Tambahan pula MACRES mula melaksanakan tiga projek IRPA baru iaitu :

- (i) *Development of Sensor for Earth Observation from Space*
- (ii) *Development of Radar Backscattering Characteristics from Space Platform*
- (iii) *Modelling Development for Dynamic Processes Monitoring in Coastal Zone Using Satellite Technologies*

### AIRSAR PACRIM

Pada tahun 1998, program ini telah memberi fokus kepada kerja analisa dan pemprosesan data PolSAR dan TOPSAR untuk membangunkan aplikasi dalam pelbagai bidang. Satu bengkel telah diadakan pada 9 - 14 Disember 1998 bagi tujuan menjalankan penyelidikan bersama dengan tiga pakar Australia. Seramai 24 peserta daripada 12 agensi yang terlibat dalam program AIRSAR-PACRIM telah menyertai bengkel ini. Antara lain, pencapaian dalam tahun 1998 ialah :-

### Satellite Image Map (SIM)

MACRES has signed a Memorandum of Understanding with the National Survey and Mapping Department on 19 March 1998 to jointly implement the SIM project. In 1998 this project had produced a database for hydrography, contour and administrative boundaries for Selangor, 10 digital terrain model sheets, 4 sheets of SIM digital products; and established 14 ground control points.

### IRPA Research Projects

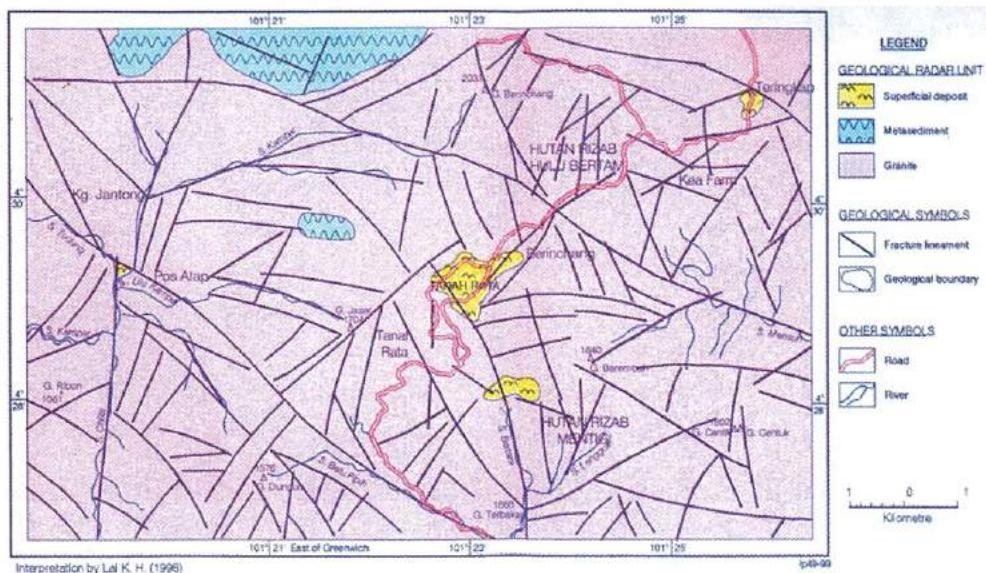
MACRES continued its implementation of both AIRSAR PACRIM programme and Land Use/Cover Mapping Using Radar Data project which started in 1997. MACRES also commenced implementation of three new IRPA projects namely :

- (i) *Development of Sensor for Earth Observation from Space*
- (ii) *Development of Radar Backscattering Characteristics from Space Platform*
- (iii) *Modelling Development for Dynamic Processes Monitoring in Coastal Zone Using Satellite Technologies*

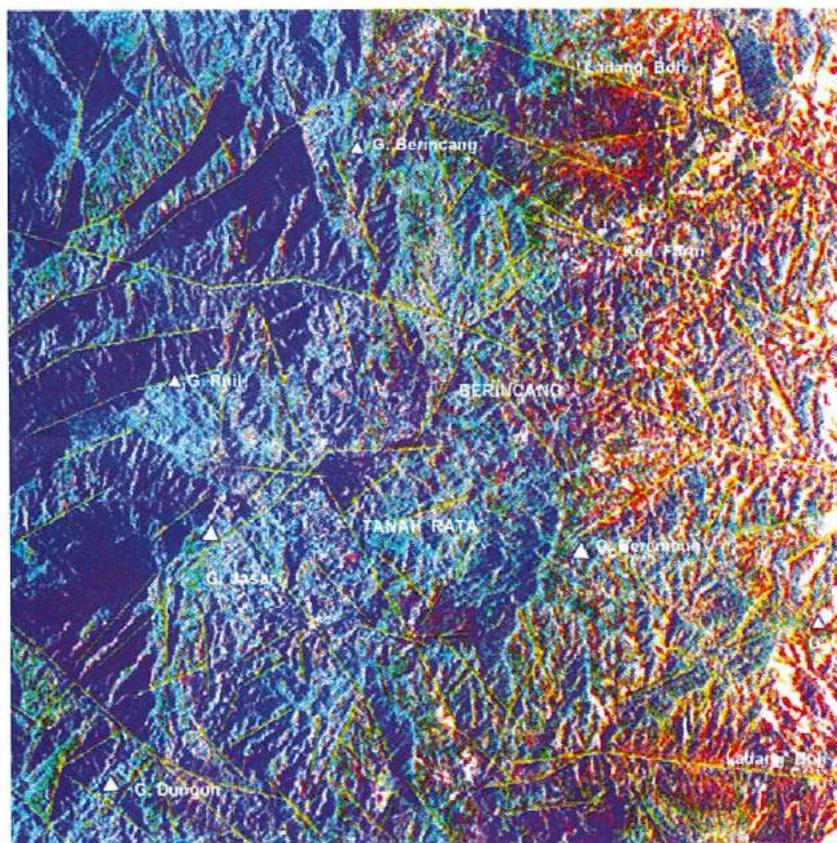
### AIRSAR PACRIM

In 1998 this programme focussed on the analyses and processing of PolSAR and TOPSAR data application development in various fields. A workshop was organised on 9-14 December 1998 to initiate collective research work with three Australian experts. 24 representatives from 12 Malaysian member agencies for AIRSAR PACRIM programme participated the workshop. Amongst others, achievements of the project in 1998 are in the development of:

- Teknologi pemetaan struktur-struktur geologi (Rajah4)
  - Teknologi pengesanan
  - Teknologi mengesan lokasi dan kelajuan kapal di laut
  - Analisa 'backscatter' antara jenis liputan bumi (Rajah5)
  - Geological structures mapping technology (Figure 4)
  - Detection technology
  - Localisation and movement of ship at sea
  - Backscatter analysis of earth covers (Figure 5)



Rajah 4 : Pemetaan struktur geologi menggunakan data AIRSAR  
Figure 4 : Geological structures mapping from AIRSAR data



Rajah 5 : Analisa pantulan permukaan bumi di Cameron Highlands.  
 Figure 5 : Fracture lineaments of Cameron Highlands.

### **Projek Kerjasama/Serantau**

Malaysia - Kanada

MACRES bersama Universiti Malaya (UM) telah menyambung projek bertajuk *SAR Backscatter Response of Various Stages of Growth of Wetland Rice* bersama UNITELE dengan kerjasama Canadian Centre For Remote Sensing (CCRS). Tiga kerja lapangan telah dijalankan di kawasan MADA untuk mengumpulkan data *Rice Growth Parameters* bersempena dengan 'Satellite Radarsat Passes'. Pihak MADA juga turut menyertai dalam projek ini. Projek ini dijangka siap pada tahun 1999.

Malaysia - Jepun

Tiada projek penyelidikan baru diujudkan dalam tahun 1998. Walau bagaimanapun, MACRES telah mengadakan satu bengkel bertajuk *Forest Canopy Density Mapping* bersama Japanese Overseas Forestry Consultants Association (JOFCA) di MACRES pada 25 Ogos 1998. Bengkel ini disertai oleh 16 orang peserta daripada pelbagai agensi pengguna.

### **INDFORSUS**

*INDFORSUS* ialah inisiatif kerjasama European Space Agency (EU)-ASEAN yang dijadualkan untuk tempoh 1997-1999. MACRES mengambil bahagian dalam projek ini bersama-sama dengan INNOPRISE Corporation Sabah Berhad. Peranan utama MACRES ialah untuk membangunkan petunjuk remote sensing bagi perhutanan mapan (*INDFORSUS*) yang berkaitan dengan komponen hidrologi dan hakisan tanah bagi projek tersebut. RM 132,000 telah disediakan oleh EU kepada MACRES untuk menjalankan projek ini di Lembah Danum, Sabah. Pada 16/8/98 - 5/9/98, seorang pegawai daripada MACRES dan INNOPRISE masing-masing telah menghadiri bengkel latihan Advanced RSI - GIS Techniques di University of Manchester, United Kingdom. Projek ini telah mencapai :-

### **Bilateral Projects**

Malaysia - Canada

MACRES together with University Telecom (UNITELE) and Canadian Centre for Remote Sensing (CCRS) continued the project entitled "SAR Backscatter Response of Various Stages of Growth of Wetland Rice". Three fieldtrips were carried out in MADA area to collect data on rice growth parameters corresponding data of Satellite Radarsat Passes. The project, also participated by MADA, is expected to be completed by 1999.

Malaysia - Japan

No new projects were implemented in 1998. However MACRES organised a workshop entitled Forest Canopy Density Mapping with Japanese Overseas Forestry Consultants Association (JOFCA) on 25 August 1998 at MACRES. This workshop was participated by 16 representatives from various user agencies.

### **INDFORSUS**

*INDFORSUS* is a joint European Union-ASEAN initiation scheduled for 1997-1999. MACRES collaborated with INNOPRISE Corporation Sabah Berhad in this project. MACRES major role is to develop remotely sensed indicators of forest sustainability (*INDFORSUS*) of relevance to hydrological and erosion components of the project. A sum of RM132,000 was allocated by EU for MACRES to undertake the task at Danum Valley, Sabah. On 16/8/98 - 5/9/98, an officer from MACRES and INNOPRISE each attended a training workshop on Advanced RSI - GIS Techniques at University of Manchester, United Kingdom Achievements for the year were :

- Mewujudkan 15 titik kawalan *Global Positioning System* di Lembah Danum.
- Menjalankan pembetulan geometrik data satelit SPOT dan Landsat TM bagi kawasan kajian mengikut unjuran *Universal Traverse Mercator (UTM)*.
- Analisa data satelit peringkat pertama untuk membangunkan teknik-teknik mengesan gangguan (*disturbance*) hutan.
- Memetakan jaringan jalan utama di Lembah Danum dengan penggunaan data satelit.
- Mewujudkan *Digital Terrain Modelling* bagi kawasan Danum.

#### Malaysia - Thailand

Projek '*Coastal Zone Studies Using the Integration of Remote Sensing and Geographic Information System (GIS)*' ditangguhkan kerana pihak Thailand meminta projek ini dimulakan pada tahun 1999. Walau bagaimanapun, MACRES telah memulakan projek di kawasan zon pantai Selangor dalam tahun 1998. Pihak Thailand dipercayai akan memulakan projeknya di kawasan zon Songkla dalam tahun 1999.

#### Projek-Projek Lain

Projek-projek ini dilaksanakan secara *ad-hoc* bergantung kepada permintaan dan keperluan dari masa kesemasa. Projek-projek tersebut termasuklah :-

- i) Satu sistem amaran awal kebakaran hutan bagi pengawalseliaan kebakaran hutan dengan menggunakan data satelit remote sensing telah dibangunkan dan dapat diperaktikkan untuk mengawalselia pembalakan hutan di beberapa tempat di Malaysia.
- i) Buku *ASEAN FROM SPACE*

MACRES telah menyediakan imej-imej satelit bagi 10 kawasan di Malaysia dan telah dimajukan untuk tindakan lanjut pihak Thailand, sebagai koordinator kepada projek ini.

- Established 15 control points for Global Positioning System at Danum Valley
- Conduct geographic correction on SPOT and Landsat TM data for the study area mengikut unjuran Universal Traverse Mercator (UTM)
- Preliminary analysis of satellite data for developing techniques to detect forest disturbance
- Established main road linkages map at Danum by using satellite data
- Established Digital Terrain Modelling for Danum area.

#### Malaysia - Thailand

The project '*Coastal Zone Studies Using the Integration of Remote Sensing and Geographic Information System (GIS)*' was postponed because Thailand requested for the project to commence in 1999. However MACRES has started this project with Selangor coastal zone. Thailand is expected to start with Songkla zone in 1999.

#### Other Projects

These projects were conducted in an ad hoc manner, depending on timely requests. They include :-

- i) An early warning system for forest fire monitoring using remote sensing data satelit was developed and this could also be used to monitor forest logging activities in several parts of Malaysia.
- ii) ASEAN FROM SPACE Book

MACRES has prepared satellite images for 10 areas in Malaysia and forwarded them to Thailand, the coordinator of this project, for further actions.

## **Penerbitan Artikel Penyelidikan dan Pembangunan**

Berikut adalah senarai artikel-artikel yang telah diterbitkan dan telah dibentangkan oleh MACRES dalam forum-forum remote sensing kebangsaan dan antarabangsa.

## **Publications of Research and Development Articles**

Below is the list of articles published and presented by MACRES in national and international remote sensing forums.

- i. Azlikamil.N (1998). Report on the Status of Remote Sensing for Mineral and Groundwater Explorations in Malaysia, International Workshop on Remote Sensing for Mineral and Ground Water Explorations, 22 - 28 Oct. 1998, Hyderabad, India.
- ii. N. Laili and H. Mariamni (1998). Assessment of Multi-Frequency and Multi-Polarisation SAR for Vegetation Mapping, 19th ACRS, 16 - 20 Nov. 1998, Manila, Philippines.
- iii. N.N. Mahmood and B. Jimat (1998). Total Forest Fire Management Plan. National Symposium on the Impact of Haze, 21 April 1998, UPM, Serdang, Malaysia.
- iv. N.N. Mahmood, K.F. Loh and A. Shahruddin (1998). Satellite Image Map as a Base for Natural Resources and Environmental Management System (NaREM), 1998. Annual Seminar of Geoinformation Engineering, 7 - 8 Sept., 1998, UTM, Kuala Lumpur.
- v. N.N. Mahmood, K.F. Loh, B. Jimat and H. Faizu (1998). Watershed Management Using Remote Sensing and Geographic Information System in Malaysia, 3 - 5 Oct., 1998, Bukit Merah, Perak, Malaysia.
- vi. N.N. Mahmood, K.F. Loh and B. Jimat (1998). Technology Applications in Priority Sectors - Housing Industry, Food and Agriculture, and Water Management, Second National Smart Partnership Dialogue 1998 - Land Development Through Smart Partnership, 24 - 25 Oct., 1998, Kuching, Sarawak, Malaysia.

# **PROGRAM OPERASI OPERATIONS PROGRAM**

## **Pembangunan Tenaga Manusia**

Program Pembangunan Tenaga Manusia (PTM) 1998 MACRES merupakan kesinambungan dari usaha yang telah dijalankan pada tahun sebelumnya untuk membangunkan tenaga mahir dan terlatih dalam bidang remote sensing. Program latihan yang dilaksanakan dalam tahun 1998 meliputi latihan jangka pendek (konferen, kursus asas, latihan sangkut) dan latihan jangka panjang lepasan ijazah.

Dalam 1998, sebanyak 106 aktiviti latihan telah disertai oleh kakitangan MACRES. Daripada jumlah ini, 19 adalah di peringkat antarabangsa. Aktiviti-aktiviti latihan yang dijalankan tersebut meliputi kursus serta latihan dalam bidang remote sensing, kemahiran pembangunan organisasi, komunikasi dan pengurusan ini telah dibiayai di bawah Peruntukan Pembangunan Tenaga Manusia, Peruntukan Mengurus serta peruntukan projek NAREM dan IRPA.

MACRES telah menganjurkan kursus asas remote sensing untuk agensi-agensi pengguna. Kursus yang dihadiri oleh 19 orang peserta dari pelbagai kerajaan dan 3 orang dari agensi swasta tersebut berlangsung selama 2 bulan secara sepenuh masa di Universiti Teknologi Malaysia (UTM). Ceramah dan taklimat mengenai tajuk-tajuk khusus remote sensing juga telah diadakan di MACRES untuk peserta dari MACRES dan agensi pengguna.

Menyedari hakikat perlunya MACRES menjadi sebuah organisasi yang mantap dan berwibawa dalam usahanya untuk menerajui pembangunan teknologi remote sensing di negara ini, MACRES telah menghantar pegawai-pegawaiannya untuk melanjutkan pelajaran peringkat ijazah sarjana menggunakan peruntukan Tabung PTM(S&T) Kementerian Sains, Teknologi dan Alam Sekitar. Sehingga kini, seramai 3 pegawai telah menamatkan pengajian mereka, manakala 7 pegawai lagi akan menamatkan pengajian mereka pada pertengahan tahun 1999.

## **Human Resource Development**

MACRES 1998 Human Resource Development Programme is the continuity of the previous year's effort in developing its human resource in remote sensing. MACRES training programmes conducted in 1998 include short - term trainings (conference, basic courses, attachment training) and long-term post graduate training.

In 1998, a total of 106 training activities were participated by MACRES staff. Out of these, 19 were at international level. These include courses and trainings in remote sensing, organisational development, communication and management. The courses were funded by the Human Resource Development Budget, Operating Budget and allocations under NAREM and IRPA projects.

MACRES also organised a basic course in remote sensing for its research officers and professionals of user agencies. It was attended by 19 participants who were from public agencies and 3 from private agencies. This 2-months course was conducted on a fulltime basis at the University of Technology Malaysia(UTM). Talks and briefings on special remote sensing topics were also organised at MACRES for participants from MACRES and user agencies.

Realising the fact that MACRES is striving to become a well established organisation in leading the country in remote sensing and related technologies, MACRES utilised fully the HRD (S&T) Fund of the Ministry of Science, Technology and the Environment to finance the post-graduate courses of its research officers. To date, 3 officers have completed their courses while the other 7 are expected to complete their respective courses in mid-1999.

Seramai 4 orang pegawai telah terpilih untuk mengikuti pelajaran peringkat sarjana tahun ini tapi hanya seorang pegawai diluluskan oleh pihak Jawatankuasa HRD (S & T) KEMSAINS untuk melanjutkan pelajaran peringkat sarjana di dalam negeri di UTM, Skudai.

MACRES juga memberi peluang kepada kakitangannya untuk membentangkan isu-isu teknikal dalam kolokium yang diadakan pada setiap hari Sabtu. Selain berkongsi pengalaman dan pelajaran, sesi kolokium juga memberi pendedahan kepada pengucapan awam dalam Bahasa Inggeris. Sebanyak 30 kolokium telah diadakan sepanjang tahun 1998.

As many as 4 officers were chosen for their masters degree this year but only one was approved by the KEMSAINS S&T Committee to undergo the programme locally at UTM, Skudai.

MACRES gave opportunities to its officers to present technical issues in colloquiums scheduled on every Saturday. Besides sharing experiences and knowledge, these colloquiums also gave exposure to public speaking in English. A total of 30 colloquiums were presented through 1998.

## Pembangunan Fisikal dan Kemudahan

### Bangunan Baru MACRES

Pembinaan bangunan ibu-pejabat ini mengalami kelewatan disebabkan kegawatan ekonomi yang turut menjelaskan industri pembinaan di negara ini. Projek ini mencapai kemajuan 92% di akhir tahun 1998.

## Physical Development and Facilities

### MACRES New Headquarters

Construction of the headquarters building experienced further delay due to the economic slow down which affected the construction industry in the country. The project recorded a progress of 92% at the end of 1998.



Pandangan sisi bangunan ibu pejabat MACRES  
Side view of MACRES headquarters building



Pandangan hadapan bangunan ibu pejabat MACRES  
Front view of MACRES headquarters building

## Kompleks Stesen Penerima Bumi

Kerja-kerja pembinaan komponen bangunan stesen penerima bumi MACRES yang telah dimulakan pada bulan Disember 1997 telah ditangguhkan pada bulan Januari 1998. Pembinaan ini diteruskan semula pada bulan Julai setelah MACRES mendapat kelulusan untuk meneruskan projek ini dan surat niat dikeluarkan kepada pihak kontraktor. Y.B. Menteri Sains, Teknologi dan Alam Sekitar telah melawat tapak projek ini pada 5 Oktober 1998.

## Ground Receiving Station Complex

Construction of the building component of the ground receiving station which was initiated in December 1997 was halted temporarily in January 1998. Work was then resumed in July when MACRES was given the necessary approval and with the issuance of letter of intent to the contractor. The Honourable Minister of Science, Technology and the Environment visited the project site on 5 October 1998.



Pandangan artis kompleks stesen bumi MACRES  
Artist impression of the MACRES ground receiving station complex



Y.B. Menteri Sains, Teknologi dan Alam Sekitar melawat tapak projek stesen penerima bumi pada 5 Oktober 1998

The Honourable Minister of Science, Technology and the Environment visiting the ground receiving station project site on 5 October 1998

## Makmal Kartografi

Makmal Kartografi telah mengeluarkan dua lembar prototaip peta imej satelit projek SIM. Peta berskala 1:50,000 ini adalah untuk kawasan Kuala Lumpur dan Rawang.

Perolehan bahan-bahan terhad terus dilaksanakan untuk tahun 1998. Jumlah bahan-bahan berkenaan yang ada dalam simpanan makmal ini adalah seperti di Jadual 1.

Jadual 1 : Jumlah bahan-bahan terhad  
Figure 1 : Total number of restricted materials

	Jenis/Type	Jumlah(keping) Total (copies)
1	Peta topografi siri L7030 (Skala 1:50 000) <b>Topographic map L7030 series (scale 1:50 000)</b>	441
2	Peta topografi siri L7010 (Skala 1:63 360) <b>Topographic map L7010 series (scale 1:63 360)</b>	136
3	Peta topografi siri T735 (Skala 1:50 000) <b>Topographic map T735 series (scale 1:50 000)</b>	337
4	Peta topografi siri T8010 (Skala 1:25 000) <b>Topographic map L8010 series (scale 1:25 000)</b>	407
5	Peta topografi siri T808 (Skala 1:10 000) <b>Topographic map L808 series (scale 1:10 000)</b>	45
6	Peta Grafik Operasi Bersama siri 1501 JOG (Darat) <b>Joint Operation Graphics Map 1501 series JOG (Land)</b>	16
7	Data topografi berdigit siri L7030 (Skala 1:50 000) <b>Digital topographic data L7030 series (scale 1:50 000)</b>	1
8	Data topografi berdigit siri T735 (Skala 1:50 000) <b>Digital Topographic data T735 (scale 1:50 000)</b>	36
9	Data topografi berdigit siri T738 (Skala 1:50 000) <b>Digital topographic data T738 series (scale 1:50 000)</b>	2
10	Data topografi berdigit siri T8028(Skala 1:25 000) <b>Digital topographic data T8028series (scale 1:25 000)</b>	36
11	Gambar udara hitam putih <b>Black and White aerial photographs</b>  Skala/scale 1: 40 000 Skala/scale 1: 25 000 Skala/scale 1: 20 000	1684 6 2043
12	Gambar udara berwarna <b>Coloured aerial photographs</b>  Skala/scale 1: 10,000	398

## Cartographic Laboratory

Two prototype of the satellite image maps for SIM project were produced by the cartographic laboratory. The 1:50,000 map covered the areas of Kuala Lumpur and Rawang.

Additional restricted materials were procured in 1998. The list of the materials currently available in the laboratory's archive is shown in Figure 1.

## Peningkatan Sistem

Kemudahan sistem komputer MACRES terdiri dari tiga kategori iaitu; sistem komputer Microvax/ Meridian; sistem Sun Client/ Server yang diperolehi dalam tahun 1996; sistem silicon graphic yang diperolehi dalam tahun 1997. Sistem komputer di MACRES disambungkan dalam 'local area network' dimana semua perkakasan 'RISC-based workstation' dan beberapa jenis komputer mikro dihubungkan ke LAN.

Perisian yang terdapat di MACRES adalah menumpukan kepada bidang remote sensing dan GIS seperti PCI, ERDAS, ER-Mapper, ARC/Info, SPANS, MICSIS dan Oracle DBMS.

Perisian PCI, ERDAS, ER-Mapper, ILWIS dan MICSIS adalah perisian bagi memproses data remote sensing seperti Landsat dan SPOT dan Radarsat. Disamping itu MACRES juga memperolehi perisian ENVI khusus untuk memproses data remote sensing '*hyperspectral*'. Keseluruhan kemudahan pemerosesaan data dan GIS yang terdapat di MACRES berjumlah lebih dari dua puluh lesen perisian yang digunakan dengan 'UNIX workstation' dan komputer mikro.

Perisian ARC/Info dan Oracle digunakan untuk pembangunan pangkalan data GIS bagi menyimpan data atribut (attribute). Oracle ini juga digunakan sebagai asas kepada pembangunan pangkalan data perpustakaan. Untuk tujuan tersebut MACRES telah memperolehi perisian '*Integrated Library Management Utility (ILMU)*' bagi membangunkan sistem pengurusan perpustakaan MACRES secara berkomputer. Perisian ILMU diperolehi dengan harga RM44,100

## System Upgrading

Computer systems facilities in MACRES comprises the Microvax/Meridian and Sun Client/Server systems purchase in 1996 and the Silicon Graphic which was acquired in 1997. These systems, mostly RISC-based workstations, and a number of microcomputers are connected by a local area network (LAN).

The main software installed in this system are the remote sensing and GIS application software of PCI, ERDAS, ER-Mapper, ARC/Info, SPANS, MICSIS and Oracle DBMS.

PCI, ERDAS, ER-Mapper, ILWIS and MICSIS are the main image processing softwares installed for processing of Landsat, SPOT and Radarsat satellite data. ENVI was also acquired to process hyperspectral data. Overall, there is a total of 20 software licences issued for UNIX workstations and microcomputers for processing remote sensing satellite data and GIS.

ARC/Info and Oracle softwares are used in the development of database system to store attribute data. In addition, the Oracle-based Integrated Library Management Utility (ILMU) was acuired at a total cost of RM44,000 to computerise MACRES library management system.

## Penerimaan Data

Projek Pembinaan Stesen Bumi MACRES (MGRS) terdiri daripada dua komponen iaitu (i) pembinaan bangunan stesen bumi di Temerloh dan (ii) perolehan dan pemasangan sistem MGRS.

Pembinaan bangunan stesen bumi sedang dijalankan oleh JKR dan dijangka siap pada bulan Mei 1999. Y.B. Menteri Sains, Teknologi dan Alam Sekitar telah membuat lawatan ke tapak stesen pada 5 Oktober 1998 untuk meninjau kemajuan perlaksanaan projek.

Walau bagaimanapun, perolehan sistem MGRS tidak dapat dilaksanakan seperti yang dujadualkan kerana beberapa masalah yang tidak dapat dielakkan. Pihak Kementerian Kewangan telah memutuskan supaya sistem MGRS ditender semula pada tahun 1999.

## Perkhidmatan pengguna

Bagi memenuhi keperluan pengguna teknologi remote sensing di Malaysia, MACRES terus menyediakan dua jenis perkhidmatan pengguna iaitu perkhidmatan data remote sensing dan khidmat nasihat/maklumat.

Perkhidmatan Data MACRES merangkumi dua aktiviti utama iaitu perolehan data remote sensing daripada pembekal luar negara, dan pemprosesan serta pengedaran data-data berkenaan bagi memenuhi permintaan pengguna. Sejumlah RM1.2 juta telah dibelanjakan untuk perolehan data satelit optikal dan radar yang terdiri daripada *Landsat TM*, *Spot*, *ERS* dan *Radarsat*. Pembelian data tahun 1998 telah ditumpukan kepada kawasan di Sabah.

Sejumlah 56 permohonan telah diterima daripada agensi-agensi pengguna untuk 163 scenes data remote sensing bagi kedua-dua bentuk cetak kekal dan digital.

## Data Reception

The MACRES Ground Receiving station (MGRS) project constituted two components, i.e. (i) construction of the ground station building in Temerloh and (ii) procurement and installation of the MGRS system.

Construction of the ground station building was carried out by JKR and was scheduled to complete in May 1999. The Honourable Minister of Science, Technology and the Environment made a visit to the site of the station on 5 October 1998.

However, there was a delay in the procurement of the MGRS system due to unforeseen circumstances. The system will be re-tendered by the Ministry of Finance in 1999.

## User services

In its endeavour to fulfill Malaysian remote sensing user requirements, MACRES continuously provided two types of user services namely, remote sensing data and advisory/information services.

Data services comprised two main activities which are acquisition of remote sensing satellite data from foreign ground receiving stations and the processing and distribution of these data according to user needs and specifications. A total of RM 1.2 million was spent to acquire optical and radar satellite data such as *Landsat TM*, *SPOT*, and *Radarsat*. Data acquisition for 1998 was focussed on areas in Sabah.

With respect to data requests from users, a total of 56 requests were received for 163 scenes of remote sensing data in both the hardcopy and digital format.

Perolehan data satelit dalam tahun 1998  
Acquisition of satellite data in 1998

Jenis data Data type	Bil. scene No. of scenes
Landsat TM	18
SPOT	50
ERS-1	3
Radarsat	35
<b>JUMLAH/TOTAL</b>	<b>106</b>

Permohonan data remote sensing mengikut format  
Remote sensing data requests according to format

Agensi/agencies	Permohonan/Requests	Scene/Scenes	Jumlah/Total	
		Cetak Kekal hardcopy	Digital/digital	
Awam/public	42	36	106	142
Swasta/private	14	8	13	21
<b>Jumlah</b>	<b>56</b>	<b>44</b>	<b>119</b>	<b>163</b>

Penjualan data satelit kepada agensi pengguna telah menyumbangkan sejumlah RM68,304. Sebanyak RM 49,148 telah dimasukkan ke dalam Akaun Hasil sementara RM19,156 dimasukkan kedalam Akaun Amanah.

Satellite data sale has contributed a sum of RM 68,304. RM49,148 was credited to the Revenue Account while RM19,156 was credited to the Trust Account

Jumlah pendapatan jualan data 1998  
Total data sales 1998

Akaun/account	Jumlah pendapatan/income
Hasil Revenue	RM 49,148
Amanah Trust	RM 19,156
<b>Jumlah</b>	<b>RM 68,304</b>

## Perkhidmatan Maklumat dan Aktiviti Promosi

Memandangkan salah satu objektif penubuhan MACRES adalah untuk membangun dan mempromosikan penggunaan teknologi remote sensing angkasa dan teknologi-teknologi lain yang berkaitan bagi pengurusan sumber dan alam sekitar dan perancangan strategik, MACRES telah mengambil langkah untuk melaksanakan projek Jaringan Komunikasi Data Remote Sensing untuk menghubungkannya dengan agensi pengguna. Projek ini merangkumi penubuhan sebuah Pusat Maklumat Remote Sensing Nasional di mana MACRES akan mewujudkan satu pangkalan data maklumat remote sensing yang dihubungkan secara *online* dengan agensi pengguna di seluruh negara. Melalui kemudahan ini, pengguna boleh mengakses pelbagai bidang maklumat teknologi remote sensing dan teknologi-teknologi lain yang berkaitan seperti sistem maklumat geografi dan sistem posisi global termasuk arkib data remote sensing MACRES.

Sebagai langkah pertama dalam perlaksanaan projek ini, MACRES telah memperolehi satu perisian aplikasi perpustakaan iaitu ILMU (Integrated Library Management Utility) bagi menggantikan perkhidmatan perpustakaan manual. Perolehan perisian perpustakaan ini dapat meningkatkan keberkesanan pengurusan dan perkhidmatan perpustakaan MACRES dan dapat dihubungkan secara *online* dengan agensi-agensi pengguna remote sensing yang lain di negara ini.

## Information Services and Promotional Activities

Realising that one of MACRES objectives is to develop and promote application of space remote sensing and related technologies for natural resources and environmental management as well as strategic planning, MACRES initiated preparation to establish Remote Sensing Data Communication Networking with user agencies. This project includes the establishment of a National Remote Sensing Information Centre which is accessible online to local users to access information pertaining to remote sensing and related technologies such as geographic information system and global positioning system, and remote sensing data archives in MACRES.

As an initial step in this project implementation, MACRES acquired a library application software i.e. ILMU (Integrated Library Management Utility) to replace the current manual library services. This software will be utilised to upgrade the library housekeeping and services as well as to establish an online linkage with other user agencies in the country.

## Aktiviti Antarabangsa

Penglibatan MACRES dalam aktiviti antarabangsa secara keseluruhan tahun ini amat memberangsangkan bagi mewujudkan kerjasama yang lebih erat dan meningkatkan pemindahan teknologi dengan negara-negara yang telah maju dalam bidang remote sensing dan teknologi berkaitan. Senarai aktiviti antarabangsa yang telah disertai oleh MACRES pada tahun 1998 adalah seperti dalam jadual di bawah:

## International Activities

MACRES participated actively in relevant international activities to foster closer cooperation and increase transfer of technologies from countries with advanced establishment in the field of remote sensing and related technologies. The international activities participated by MACRES in 1998 are listed as follows:

Tarikh Date	Aktiviti Activity	Negara Country
12 -15 Januari	<i>Meeting of the SARCRS/LUCC Post Synthesis</i>	Bangkok, Thailand
26 Februari	<i>Silicon Graphic ASEAN Imaging Seminar Information</i>	Singapore
18 -20 Mei	<i>Meeting of the Regional Working Group on RS/GIS/SBP</i>	Cebu, Philippines
21 Mei	<i>Meeting of the Inter-agency Subcommittee on Space Application for Sustainable Development in Asia and the Pacific</i>	Cebu, Philippines
22 -23 Mei	<i>Fourth Session of the Intergovernmental Consultative Committee on the Regional Space Application for Sustainable Development</i>	Cebu, Philippines
23 -27 Mei	<i>EU-ASEAN INDFORSUS Project Meeting</i>	Chiangmai, Thailand
21-23 Jun	<i>Fifth Session of Asia-Pacific Regional Space Agency Forum Meeting</i>	Ulaanbatar, Mongolia
2 - 4 Julai	<i>Simposium French Space Technologies and Their Applications</i>	Singapore
6-8 Julai	<i>The 11th Meeting of Asean Experts Group on Remote Sensing</i>	Singapore
16 - 20 November	<i>The 19th Asian Conference on Remote Sensing</i>	Philippines
7 - 11 Disember	<i>Regional Seminar on Earth Observation for Tropical Ecosystem management Sustainable Development Of The ESCAP</i>	Bangladesh

## Mesyuarat Kumpulan Pakar Remote Sensing ASEAN ke 10

Mesyuarat *The Tenth Meeting of the ASEAN Experts Group on Remote Sensing* telah diadakan pada 6-8 Julai, 1998 di Singapura. Mesyuarat ini telah dihadiri oleh delegasi dari negara anggota ASEAN - Brunei, Indonesia, Malaysia, Filipina, Singapura, Thailand dan Vietnam serta para delegasi jemputan dari organisasi yang aktif dalam bidang remote sensing seperti European Space Agency (ESA), National Space Development Agency (NASDA) of Japan, Ably Consulting of Japan, Australian Centre for Remote Sensing (ACRES), National Remote Sensing Centre of China, Centre National d'Etudes Spatiales (CNES) of France, Canada Center for Remote Sensing (CCRS), Mekong River Commission Secretariat, RADARSAT International (RSI), Saskatchewan Research Council (SRC), COGEOENVIRONMENT dari Kanada dan SPOT Asia. Mesyuarat ini dipengerusikan oleh Malaysia yang diwakili oleh MACRES.

Diantara lain, mesyuarat ini telah membincangkan kertas cadangan Malaysia mengenai *Framework for Enhancing ASEAN Collaboration in Space Technology Applications for Development*. Cadangan ini memberi penekanan kepada kerjasama serantau yang diperlukan bagi pembangunan teknologi angkasa ASEAN. Projek ASEAN Forest Fire Early Warning System and Forest Fire Risk Maps telah dicadang dibangunkan di bawah agenda ASEAN Observation Programme di mana Malaysia dan Singapura telah dipertanggungjawabkan untuk merumuskan dengan terperinci cadangan projek ini.

## Tenth Meeting of the ASEAN Experts Group on Remote Sensing

The Tenth Meeting of the ASEAN Experts Group on Remote Sensing was held on 6-8 July 1998 in Singapore. The meeting was attended by delegations from ASEAN member countries - Brunei, Indonesia, Malaysia, Filipina, Singapura, Thailand and Vietnam as well as invited delegations from remote sensing related organisations which comprises European Space Agency (ESA), National Space Development Agency (NASDA) of Japan, Ably Consulting of Japan, Australian Centre for Remote Sensing (ACRES), National Remote Sensing Centre of China, Centre National d'Etudes Spatiales (CNES) of France, Canada Center for Remote Sensing (CCRS) of Canada, Mekong River Commission Secretariat, RADARSAT International (RSI) of Canada, Saskatchewan Research Council (SRC) of Canada, COGEOENVIRONMENT of Canada and SPOT Asia of Singapore. The meeting was chaired by Malaysia represented by MACRES.

Amongst others, the meeting discussed the proposal on Framework for Enhancing ASEAN Collaboration in Space Technology Applications for Development. The proposal, submitted by Malaysia, focussed on the regional collaboration in the development of space remote sensing technology in ASEAN. The meeting agreed that the ASEAN Forest Fire Early Warning System and Forest Fire Risk Maps be developed under the ASEAN Observation Programme agenda for which Malaysia and Singapore were given the responsibility to formulate a detail proposal.

Mesyuarat juga telah membincangkan aktiviti-aktiviti utama Kumpulan Pakar ini yang turut merangkumi projek kerjasama ASEAN-China, Projek Kerjasama ASEAN-Australia bertajuk *Technology for Updating Maps Using Remote Sensing*, Projek Kerjasama ASEAN-Kanada dan Kenaikan Taraf Kumpulan Pakar Remote Sensing ASEAN ke peringkat Jawatankuasa Kecil di bawah ASEAN-COST.

The meeting also discussed major activities of ASEAN Experts Group on Remote Sensing which include bilateral projects between ASEAN-China, ASEAN-Australia Project on Technology for Updating Maps Using Remote Sensing, ASEAN-Canada bilateral projects and Elevation of ASEAN Experts Group on Remote Sensing to a Sub - Committee Level under COST.



Mesyuarat Kumpulan Pakar Remote Sensing ASEAN ke 10  
Tenth Meeting of the ASEAN Experts Group on Remote Sensing

### Bengkel Kerjasama ASEAN - Australia: Technology for Updating Maps Using Remote Sensing

MACRES dan AUSLIG, Australia telah bekerjasama menganjurkan bengkel *Technology for Updating Maps Using Remote Sensing* di Hotel Crown Princess, Kuala Lumpur pada 18-20 Ogos, 1998. Bengkel ini adalah bengkel kedua program ASEAN Experts Group on Remote Sensing yang dikendalikan di bawah projek kerjasama ASEAN dan Australia. Peserta yang menghadirinya terdiri dari wakil-wakil negara ASEAN seperti Singapura, Brunei, Indonesia, Filipina, Malaysia, Thailand dan Vietnam. Beberapa pembentangan kertas telah dibuat oleh wakil-wakil ESA, SPOT Asia, SPOT Image, University of New South Wales dan AUSLIG.

### Bilateral Workshop Asean - Australia: Technology for Updating Maps Using Remote Sensing

MACRES and AUSLIG, Australia had jointly organised a workshop on Technology for Updating Maps Using Remote Sensing at Crown Princess Hotel, Kuala Lumpur, on the 18-20 August 1998. This is the second workshop organised by the ASEAN Experts Group on Remote Sensing Programme under the bilateral projects between ASEAN and Australia. Participants were from seven ASEAN member countries namely Singapore, Brunei, Indonesia, Philippines, Malaysia, Thailand and Vietnam. A number of presentations were made by representatives from ESA, SPOT Asia, SPOT Image, University of New South Wales and AUSLIG.



Peserta Bengkel Asian-Australia  
Remote Sensing/Mapping Project  
sedang menjalani latihan  
Participants in the Asian-Australia  
Remote Sensing/Mapping Project  
undergoing their training

Peserta Bengkel Asian-Australia  
Remote Sensing/Mapping Project  
sedang menjalani latihan  
Participants in the Asian-Australia  
Remote Sensing/Mapping Project



# PENTADBIRAN DAN KEWANGAN ADMINISTRATION AND FINANCE

## KEWANGAN

## FINANCE

### Peruntukan dan Perbelanjaan

### Allocation and Expenditure

Prestasi Perbelanjaan Mengurus MACRES mencapai 90.29% atau RM4,404,106 daripada jumlah peruntukan yang diluluskan sebanyak RM4,879,640. Sementara itu prestasi Perbelanjaan Pembangunan mencapai 95.54% atau RM16,392,156 dari jumlah peruntukan yang diluluskan iaitu RM17,162,000. Prestasi keseluruhan perbelanjaan MACRES ialah 94.35% atau RM20,796,262 dari keseluruhan jumlah Peruntukan Mengurus dan Pembangunan sebanyak RM22,041,640.

MACRES Operating Expenditure achieved 90.29% or RM4,404,106 out of the approved allocation of RM4,879,640. As for the Development Budget, 95.54% or RM16,392,156 was spent as compared to the total approved allocation of RM17,162,000. MACRES overall expenditure reached 94.35% or RM20,796,262 of total Operating and Development Budget which amounted to RM22,041,640.

Kedudukan Peruntukan dan Perbelanjaan 1998  
1998 Budget and Expenditure Status

Peruntukan Allocation	Lulus Approved	Belanja Spent	%Perbelanjaan Expenditure
Peruntukan Mengurus Operating Budget	4,879,640	4,404,106	90.29
Peruntukan Pembangunan Development Budget	17,162,000	16,392,156	95.54
Jumlah Total	22,041,640	20,796,262	94.35

## Hasil

Kutipan hasil MACRES tahun 1998 merosot sebanyak 44.47% kepada RM125,126 berbanding RM225,333 pada tahun 1997. Punca utama kemerosotan ialah kesan kegawatan ekonomi di mana pembelian data dari sektor swasta yang menyumbang kepada Hasil Kerajaan merosot dari RM145,363 kepada RM51,545.

## Revenue

MACRES revenue in 1998 decreased by 44.47% amounting to RM125,126 as compared to RM225,333 in 1997. This is due to the impact of economic crisis whereby data purchase from the private sector which normally contribute to the Government Revenue has reduced from RM145,363 to RM51,545.

### Kedudukan Hasil 1998/ Revenue 1998

Akaun/ Account	1997(RM )	1998(RM )
Akaun Amanah/Trust Account	79,970	73,581
Akaun Hasil Kerajaan Government Revenue Account	145,363	51,545
Jumlah/Total	225,333	125,126

## Pengambilan Kakitangan

Bilangan jawatan yang diluluskan untuk MACRES ialah 137 jawatan yang terdiri daripada 76 jawatan Kumpulan Pengurusan dan Profesional, dan 61 jawatan Kumpulan Sokongan. Pada tahun 1998, status pengisian jawatan MACRES menurun kepada 87 pengisian jawatan berbanding dengan 91 pengisian jawatan dalam tahun sebelumnya.

## Recruitment

MACRES was approved 137 posts of comprising 76 for Management and Professional Group, and 61 for the Supporting Group. In 1998, the staffing status decreased to 87 from the previous year figure of 91posts .

### Pengisian Jawatan / Recruitment

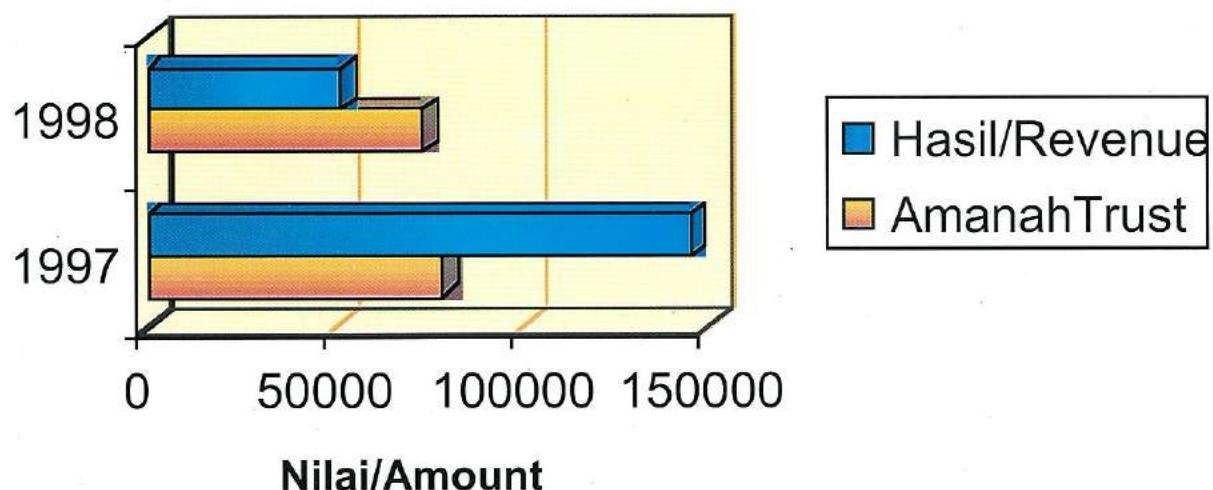
Kumpulan Group	Bil Jawatan No. of posts	1997	1998
Kumpulan Pengurusan dan Profesional Management and profesional Group	76	57	54
Kumpulan Sokongan Supporting Group	61	34	33
Jumlah Total	137	91	87

## *PETUNJUK PRESTASI PERFORMANCE INDICATORS*

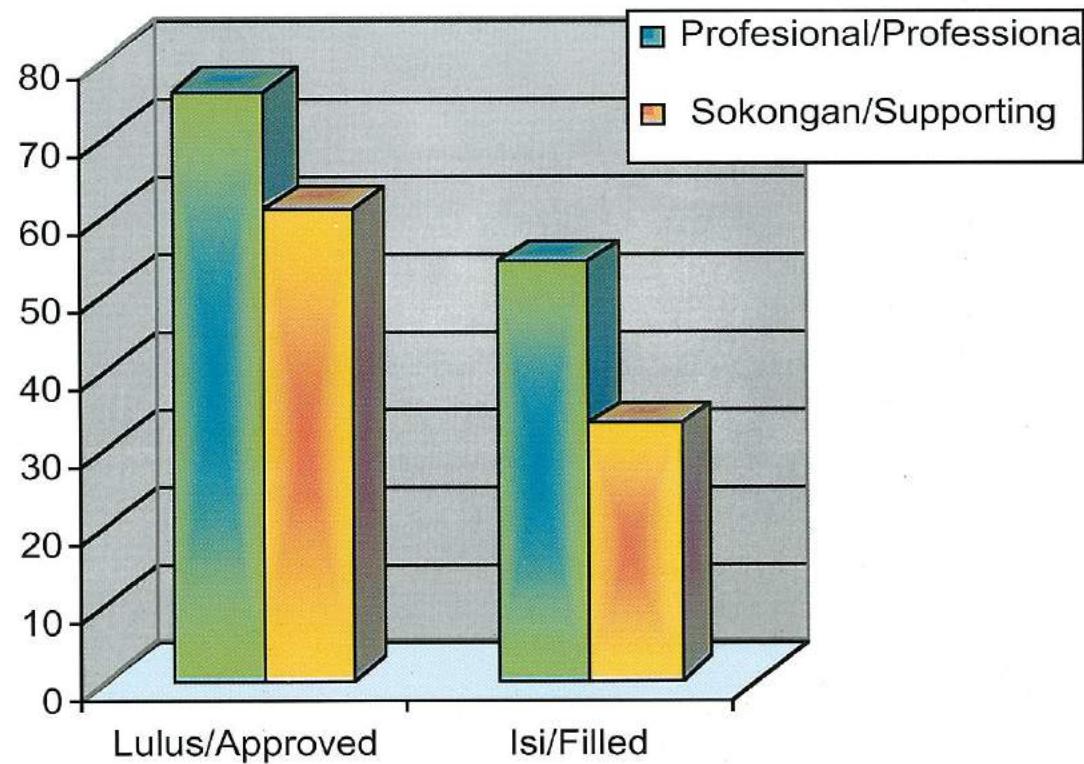
**Perbelanjaan Pembangunan MACRES 1998**  
**MACRES Development Expenditures in 1998**

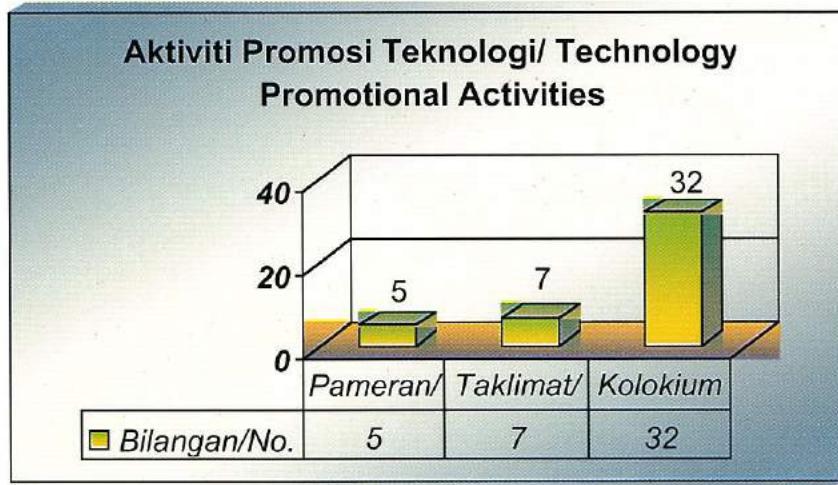
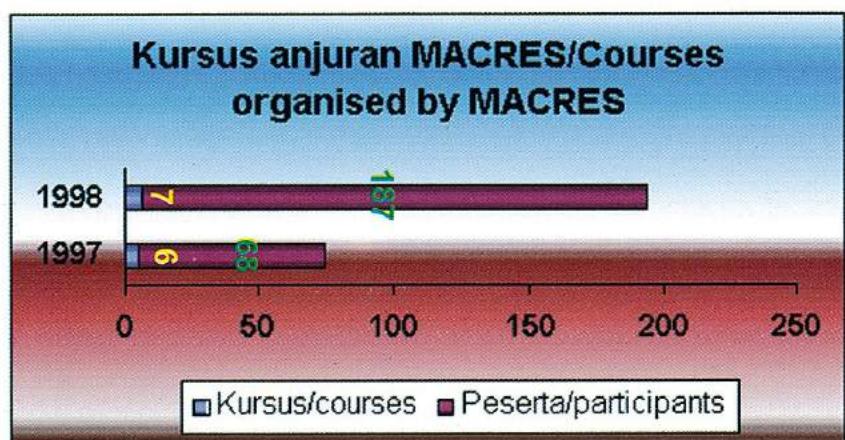
Projek Project	Peruntukan Allocation	Perbelanjaan Expenditure	Prestasi Performance %
1. Pembinaan stesen bumi Ground Station construction	1,900.00	1050.00	55.27
2. Bangunan baru MACRES MACRES new building	12,467,000.00	12,456,653.00	99.92
3. Kajian perunding stesen bumi Ground station consultancy study	792,100.00	342,484.00	43.24
4. Pembangunan tenaga manusia Human resource development	550,000.00	543,142.00	98.75
5. Pengurusan Sumber Asli & Alam Sekitar (NAREM) Natural Resources & Environmental Management (NAREM)	550,000.00	361,154.00	65.66
6. Perolehan data satelit Satellite data acquisition	1,250,000.00	1,206,524.00	96.52
7. Peta Imej satelit (SIM) Satellite Image Map (SIM)	105,000.00	86,231.00	82.13
8. Sistem keselamatan Security system	1,400,000.00	1,354,413.00	96.74
9. Peningkatan sistem System upgrading	46,000.00	45,502.00	98.92
Jumlah keseluruhan Overall	17,162,000	16,397,156.01	95.54

## Kutipan Hasil MACRES



## Pengambilan Kakitangan/Staff Recruitment





## LAMPIRAN-LAMPIRAN APPENDICES

**SENARAI PELAWAT MACRES1998**  
**MACRES VISITORS' LIST 1998**

<b>Tarikh/Dates</b>	<b>Pelawat/visitors</b>	<b>Bilangan/Number</b>
21/01/98	Pelajar UPM ( Bachelor Bioindustry)	12
19/02/98	Jabatan Pertahanan Iran	10
25/02/98	Pakar UNDP, Bangkok - Dr. Bob Ryerson & Dr. Simsek Pala	2
02/03/98	Ably Consulting Ltd. Bangkok	4
06/03/98	Pelajar Jabatan Geografi UKM	3
07/03/98	Spor Electron Ltd., Ottawa	1
10/03/98	Jabatan Pertanian ( Projek Johor Barat) dan Syarikat Sistem Informasi Bumi	8
16/03/98	Bekas KSU Kementerian Sains, Teknologi & Alam Sekitar	1
24/03/98	Universiti Sains Malaysia dan Dr. Roy Haines Young	2
02/04/98	GEO Spectrum, Russia dan Mr. Kouritsyn	7
10/04/98	KSU Kementerian Sains, Teknologi & Alam Sekitar	1
29/04/98	Jabatan Perhutanan Malaysia	18
05/05/98	MINDEF	25
22/05/98	Mr. Ian Douglas ( INDFORsus Project Group)	7
04/06/98	CSIRO Marine Research dan Mr. Mick Haywood	3
10/07/98	SASK Research Council, Canada - Mr. Rick Tofani	1
18/07/98	ITM (Jabatan Sains Ukur & Geomatik)	15
24/07/98	Universiti Telekom (Prof. Dr. Cheah Hean Teik)	1
24/07/98	Mr. Keneichi Hirokawa, Ably Consulting, Jepun	1
31/07/98	Mr. Oleg Snitseren, Russia	1
03/08/98	Tentera Udara DiRaja (Lt. Kol. Roslan Saad)	1
10/08/98	MEISSYS SB (Mr. Franas Lee)	2
11/08/98	Time Telekom (En. Nizam)	2

<b>Tarikh/Dates</b>	<b>Tetamu/visitors</b>	<b>Bilangan/Number</b>
11/08/98	Institut Teknologi MARA (En. Kamaruzaman)	1
14/08/98	GEO Consultant (Mr. Yee Thien Seng)	1
15/08/98	JUPEM (En. Mohamed Kamali)	3
17/08/98	Ramgate (En. Norzalimi Abu Bakar)	2
17/08/98	SPOT Asia (Mr. Foo Weng Kee)	1
19/08/98	University of New South Wales , Australia ( Dr. Tony Miller)	1
24/08/98	Jabatan Perikanan (En. Raihan Hj. Ahmad)	1
26/08/98	Mr. John Grant , Canada	1
26/08/98	Yayasan Sabah (En. Awang Mohdar)	1
28/08/98	MARDI (Dr. Mohd. Razali Mispan)	1
04/09/98	TropBio Forest (En. Zamhari)	2
05/09/98	USM (Pn. Anisah Lee)	1
05/09/98	Davotek (Mr. John Kar)	5
08/09/98	Ministry of Science and Tech. India (Dr. Kulshreshnia)	3
08/09/98	French Embassy (Mr. Laurent)	1
02/10/98	Mr. M. Pierre dan Mr. Henri Pisani	2
15/10/98	Pelajar (Kursus Asas Peperangan Elektronik, ATM)	26
20/10/98	Jabatan Perancangan Bandar dan Desa	20
02/11/98	UN/ESCAP, Bangkok	1

**SENARAI PEROLEHAN DATA REMOTE SENSING**  
**REMOTE SENSING DATA ACQUISITION LIST**

**PEROLEHAN LANDSAT TM 1998**

Source : NRCT, Thailand

Processing Level : Level 4

No.	Scene ID	Acquisition Date	Cloud Cover
1.	116/56	21.07.98	6617
2.	116/57	06.10.97	2105
3.	117/55 Q3	10.08.97	7614
4.	117/56	10.08.97	0020
5.	118/55 Q4	14.06.97	9720
6.	118/56	07.12.97	0004
7.	119/57	15.01.98	1014
8.	120/59 Q3	02.10.97	6807
9.	125/58 Q3	03.09.97	0617
10.	125/59	03.09.97	4412
11.	126/56 Q3	25.08.97	6817
12.	126/57	05.03.98	3515
13.	126/58	22.06.97	3007
14.	126/59	10.09.97	1075
15.	127/57	23.01.98	3502
16.	127/58	08.02.98	0200
17.	128/56	03.03.98	0400
18.	128/57	03.03.98	

**Data Type : Spot 1 & 2**

Source : CRISP - Spot Asia

No.	K	J	Mode	Acq. Date	Area
1.	269	338	X	09.05.97	Kota Bharu - Sg. Kelantan
2.	269	339	P	01.10.97	Jeli
3.	269	343	X	28.12.97	Petaling Jaya - Kelang
4.	269	344	X	11.06.97	Sepang
5.	270	339	X	29.05.97	Besut - Pasir Putih
6.	271	340	X	29.05.97	Ulu Trengganu
7.	272	339	P	20.06.97	Kuala Trengganu
8.	272	340	P	20.06.97	Marang
9.	273	343	P	10.08.97	Nenasi
10.	274	347	X	06.03.97	Pontian - Kukup
11.	275	347	X	25.01.97	Kota Tinggi - Singapura
12.	297	339	P	02.09.97	K. Penyu - Labuan - P. Tiga
13.	297	339	X	07.09.97	K. Penyu - P. Labuan
14.	298	338	X	28.09.97	Kota Kinabalu
15.	268	340	X	27.02.98	Lojing
16.	268	342	X	01.03.98	South Ipoh - Slim River
17.	268	343	P	22.05.98	Sg. Bernam - Sg. Selangor
18.	268	343	X	22.05.98	Sg. Bernam - Sg. Selangor
19.	269	343	P	23.01.98	Kuala Lumpur
20.	269	343	P	25.03.98	Rawang
21.	269	343	X	21.04.98	Rawang
22.	269	343	X	06.03.98	Rawang
23.	269	344	X	21.04.98	Sepang
24.	270	343	X	14.02.98	East Selangor
25.	270	344	P	21.04.98	Paya Indah, Sepang
26.	270	344	X	21.03.98	Port Dickson
27.	271	345	X	28.02.98	Melaka
28.	272	345	X	28.02.98	Muar
29.	273	344	X	02.06.98	Sg. Rompin
30.	275	344	P	09.07.97	P. Tioman
31.	275	347	P	12.06.98	J.B - Singapore
32.	275	347	X	12.06.98	J.B - Singapore
33.	293	335	X	18.05.98	Spratly
34.	294	342	X	14.02.98	South Miri - Sibuti
35.	294	343	X	14.02.98	Niah
36.	294	344	X	14.02.98	Tubau
37.	295	342	X	14.02.98	Marudi
38.	299	336	X	15.04.98	Kudat - Telaga
39.	302	340	X	10.03.98	Lembah Danum
40.	304	340	X	22.05.98	Semporna

**Data Type : Spot 4**

Source : CRISP - Spot Asia

**DATA TYPE : RADARSAT**

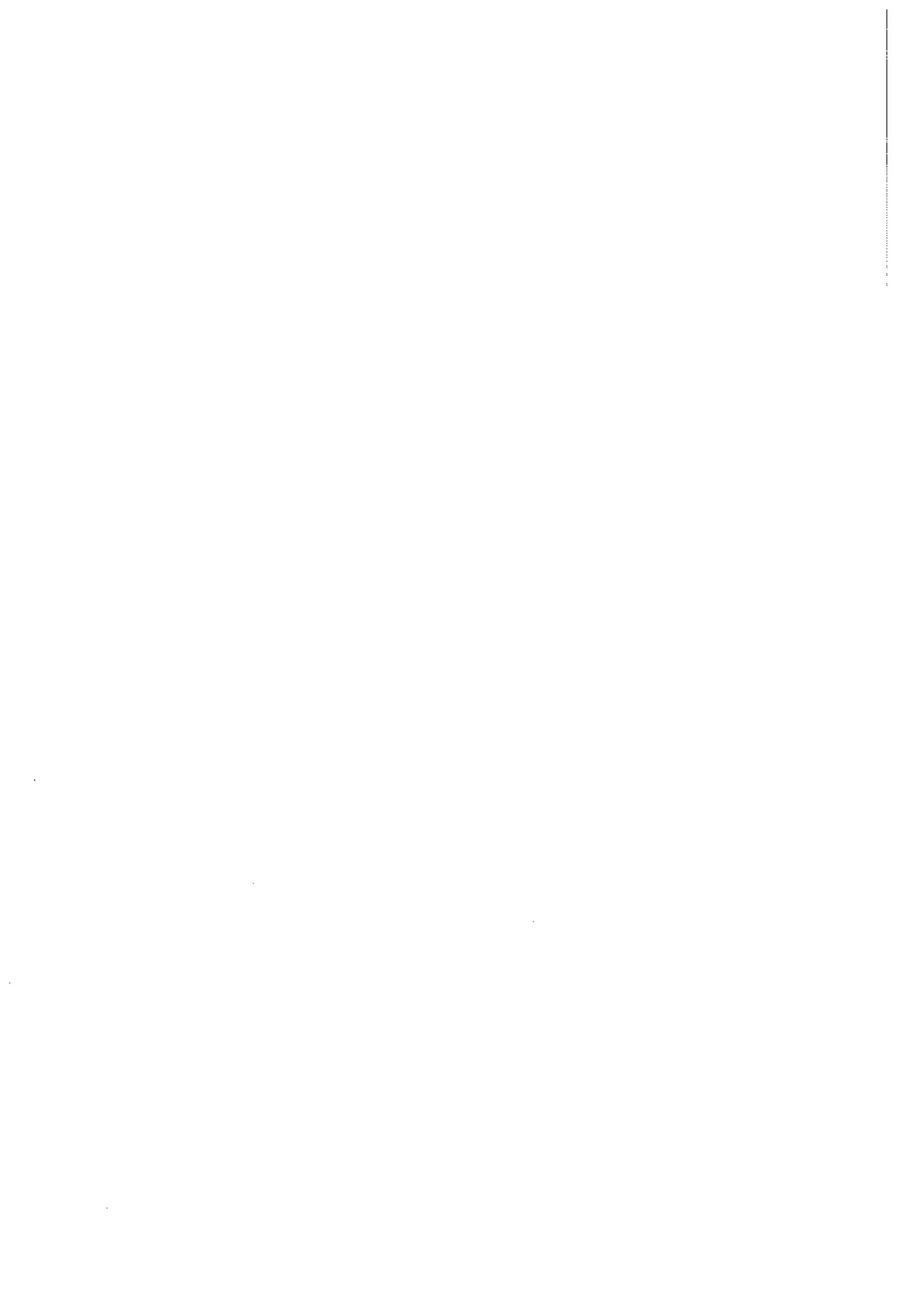
Bil.	Area	Mode/Heading	Acq. date
1.	Selangor	S2/ descending S7/ descending	10.07.98 20.05.98
2.	Telok Datuk	F5/ descending	31.07.98
3.	Telok Datuk	W2/ descending	17.07.98
4.	P.Pinang	S5/ ascending	18.07.98
5.	Kuala Lumpur	S4/ascending	25.07.98
6.	Johor Baharu	S2/ascending	09.06.97
7.	Slim River	F3/ descending	26.03.98
8.	Slim river	F3/descending	26.03.98
9.	Selangor	S7/descending	31.12.97
10.	Selangor	S6/descending	14.12.97
11.	Area : West Johore		
	Orbit : 12782		
	Date : 98-04-16		
	Time :22:41:49.905		
	Beammode : S7		
	Inc. angle : 44.3 - 49.2		
	Sensor orientation : right looking		
	Heading : descending		
	Scene centre : 1.520/103.426 ( 1 31.2' / 103 25.6')		
12.	Area : Johore		
	Orbit : 01170		
	Date : 96-01-25		
	Time : 11:30:20.451		
	Beam mode : S7		
	Inc angle : 44.5 - 49.4		
	Sensor orientation: right looking		
	Heading : ascending		
	Scene centre : 10640 / 103.826 ( 1 38.4 ' / 103 49.6')		
13.	Area : East coast peninsular		
	Orbit : 01170		
	Date : 96-01-25		
	Time : 11:31:08.291		
	Beam mode : S7		
	Inc angle : 44.5 - 49.4		
	Sensor orientation : right looking		
	Heading : ascending		
	Scene centre : 4.460 / 103.220 ( 4 27.6' / 103 13.2')		

14. Area : Selangor  
Orbit : 12925  
Date : 98-04-26  
Time : 22:49:59.701  
Beam mode : S7  
Inc angle : 44.3 - 49.2  
Sensor orientation : right looking (normal)  
Heading : descending  
Scene centre: 2.680 / 101.556 ( 2 40.8' / 101 33.4')
15. Area : Straits of Melaka - oil spill images  
Beam mode : wide beam  
Date : 97-10-26  
Scene centre: 1.640 / 102.760 ( 1 38.4' / 102 45.6')
16. Area : North Selangor - Cameron Highland  
Date : 96-12-25  
Beam : S6 (Standard)  
Inc Angle : 44.12  
Heading : descending
17. Area : Kuching, Sarawak  
Date : 98-01-04  
Beam : S6 (Standard)  
Heading : descending
18. 16 scenes over Sabah  
Date : 1997 -1998  
Beam : Fine  
Heading : descending

**DATA TYPE : ERS**

Bil. Tech. specifications

1. Area : Hulu Langat, Selangor  
SCENE ID : E13271435379710170334361  
Mission : E1  
Orbit : 32714  
Frame : 3537  
Date : 97 - 10 - 17  
Start time : 03:34:36.139  
Heading : Descending  
Scene centre : 3.435 / 101.645
  
2. Area : Hulu Langat, Selangor  
SCENE ID : E21304135559710180334563  
Mission : E2  
Orbit : 13041  
Frame : 3555  
Date : 97-10-18  
Start time : 03 : 34 : 56.318  
Heading : Descending  
Scene centre : 2.540 / 101.449
  
3. Area : Hulu Langat, Selangor  
SCENE ID : E21377135559712080331582  
Mission : E2  
Orbit : 13771  
Frame : 3555  
Date : 97-12-08  
Start time : 03:31:58.281  
Heading : Descending  
Scene Centre : 2.540 / 102.173





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