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PAKISTAN'S SPACE PROGRAMME

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Space Applications

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Sequence of Presentation

- Introduction to SUPARCO
- Current Status
- Future Plans
- Challenges and Opportunities

Introduction

- SUPARCO, the national space agency of Pakistan, established in 1961, upgraded to Commission in 1981
- Promote peaceful exploration and applications
- Devoted to R&D in space science and space technology
- Develop indigenous capabilities in space technology for the peaceful uses of outer space
- Aimed at socioeconomic uplift of the country

Current Status

- Design, development and launching of scientific and meteorological rockets
- Design and development of experimental satellites (Badr-1 launched July 1990, & Badr-B Dec 2001)
- R&D for Satellite Launch Vehicle
- A variety of Satellite Remote Sensing Applications
- Operating LUT/MCC for COSPAS-SARSAT Search and Rescue system
- Receiving data from Landsat and SPOT series of satellites at its Satellite Ground Station at Islamabad

Cont'd.....

Current Status

- Receiving meteorological and environmental data
- Study and exploration of the middle and upper atmosphere using rockets, balloons and Ionosphere Sounding Stations
- Operation of Geomagnetic Observatory for study of Earth's magnetic field
- Actively engaged in promoting the use of space technology applications by:
 - Undertaking pilot projects
 - Conducting specialized training courses in Remote Sensing (RS) and Geographic Information System (GIS)
 - Capacity building of government departments and private sector organizations in the use of space technology and applications

Current Status

Contributing to the socio-economic development of the country by using space technology and its applications. Some of the areas in which satellite remote sensing, satellite communication and GNSS applications are prominent are:

- Agriculture – crop estimation
- Water resource management
- Mitigation of natural disasters
- Land use
- Mapping
- Surveying
- Forestry
- Droughts
- Desertification studies
- Vehicle tracking & fleet management
- Environmental monitoring
- Climate change
- Education

Future Plans

In the next 5 years:

National Satellite Development Program (NSDP)

- Paksat-1R
- Remote Sensing Satellite System (RSSS-1)
- Human Resource Development

Future Plans

- In the following 20-25 years:
 - Communication Satellite programme includes: 4-5 satellites depending upon requirements
 - Meteorological Satellite/s
 - Satellite Launch Vehicles Programme
 - Phase-I to inject ~ 200 kg class satellites (600-1000 km)
 - Phase-II to inject ~ 500 to 800 kg class satellites (600-1000 km)
 - Phase-III to inject 1 ton class and above satellites (600-1000 km)
 - Phase-IV to inject 1 ton class and above satellites (~ 36000 km)

Future Plans

Other future activities include:

- Developing expertise in advanced Remote Sensing and GIS applications
- Capacity building in microwave, Lidar and Hyperspectral imagery exploitation
- Promoting the use of satellite communication for
● Telemedicine and Tele-education

International Cooperation

- United Nations Committee on Peaceful Uses of Outer Space (UN-COPUOS)
- United Nations Economic & Social Commission for Asia and the Pacific (UN ESCAP)
- Committee on Space Research (COSPAR)
- Asia Pacific Space Cooperation Organization (APSCO)
- International Committee on Photogrammetry and Remote Sensing (ISPRS)
- National Coordination Committee for COSPAS-SARSAT
- American Institute for Aeronautics and Astronautics (AIAA)
- International Astronomical Federation (IAF)
- International Academy of Astronautics (IAA)
- Inter- Islamic Network of Space Sciences and Technology (ISNET)

Challenges and Opportunities

- Opportunities

- Space technology and its applications offer great opportunities in the realm of socio-economic development and national security
- In the context of nuclear security, space technology could help in promoting transparency, verification regimes and early warning

- Challenges

- A robust and self-reliant space programme is essential for exploiting the opportunities. However, there are impediments, which include:

- Sanctions
- Resource constraints

- While bilateral and multilateral cooperative arrangements for disaster mitigation, poverty alleviation and sustainable development are possible and there are many initiatives to achieve these, there is little possibility of an agreement on a common system for a space-based early warning system

THANK YOU

Payloads onboard BADR-B

a) CCD Camera:

Resolution ~ 300 m

Purpose: Cloud Detection, Earth Imaging & Monitoring,
Technology Demonstration

b) Dosimeter:

To measure atmospheric radiation

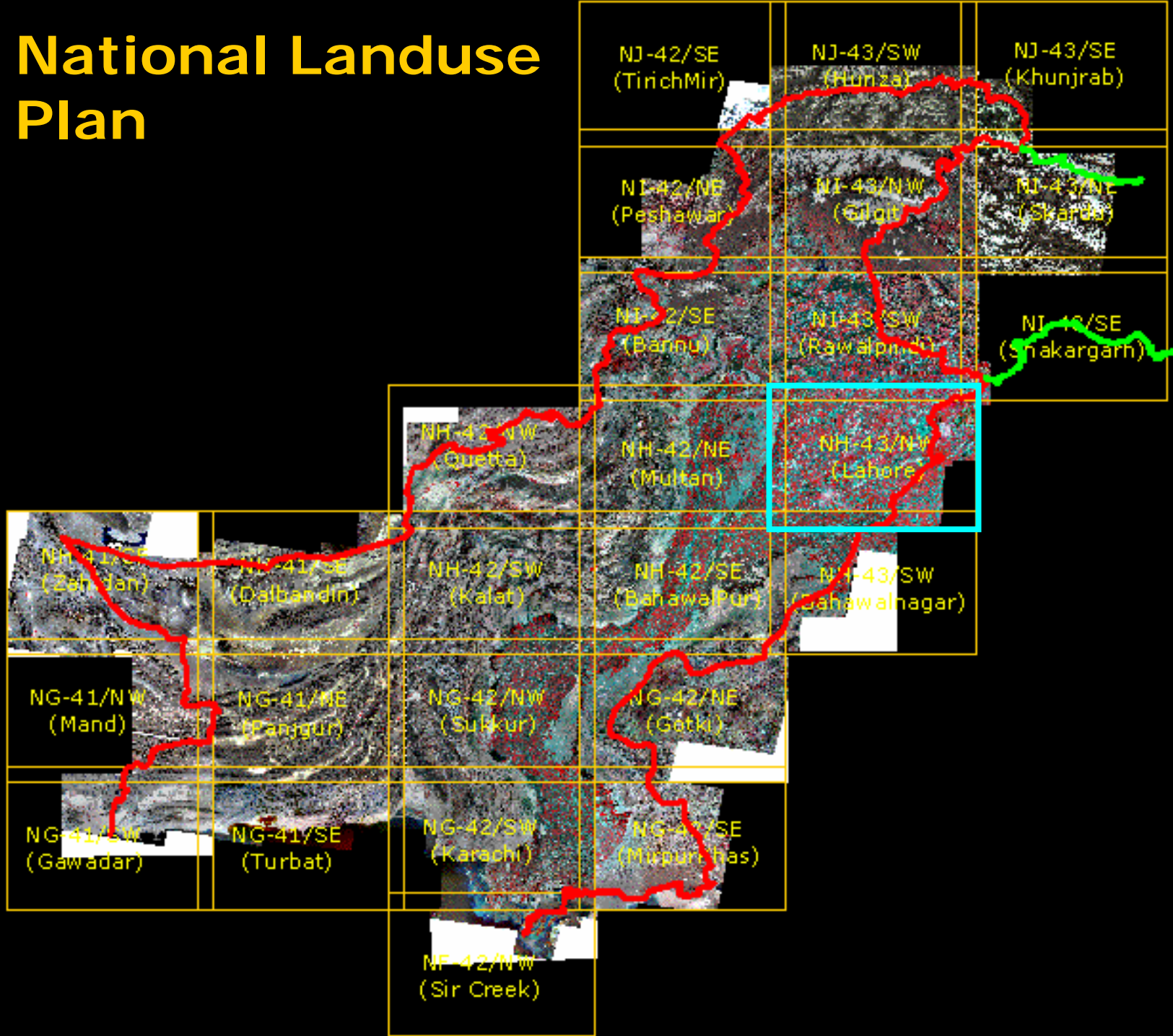
c) Store & Forward Experience (SAFE)

Exchange of messages / text between 2 user terminals globally

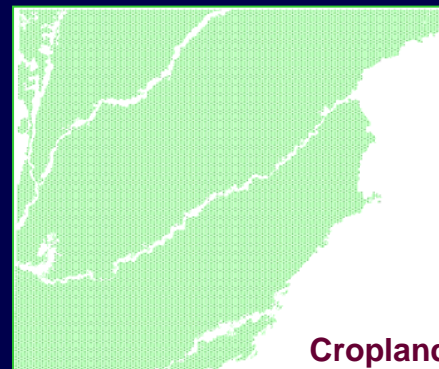
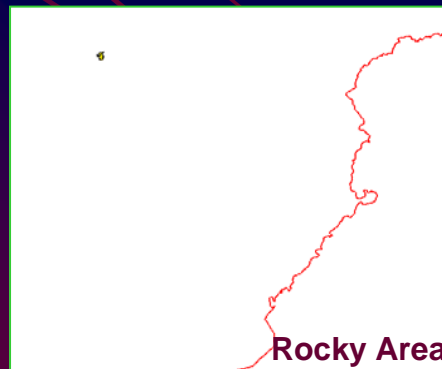
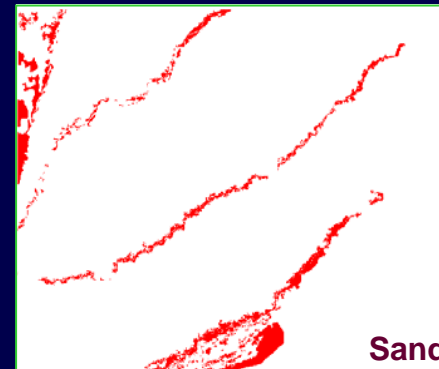
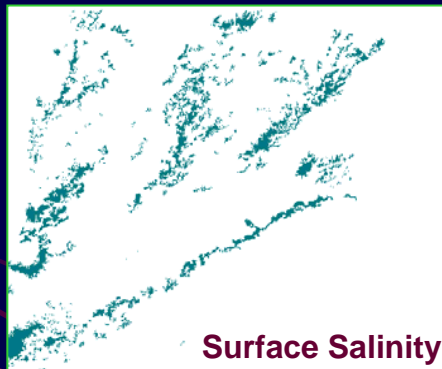
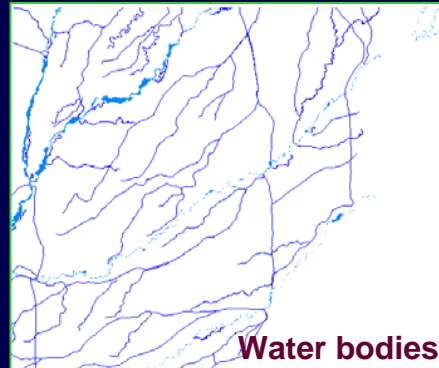
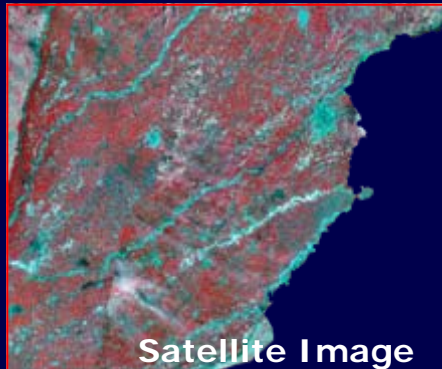
d) Battery-End-of-Charge Detection:

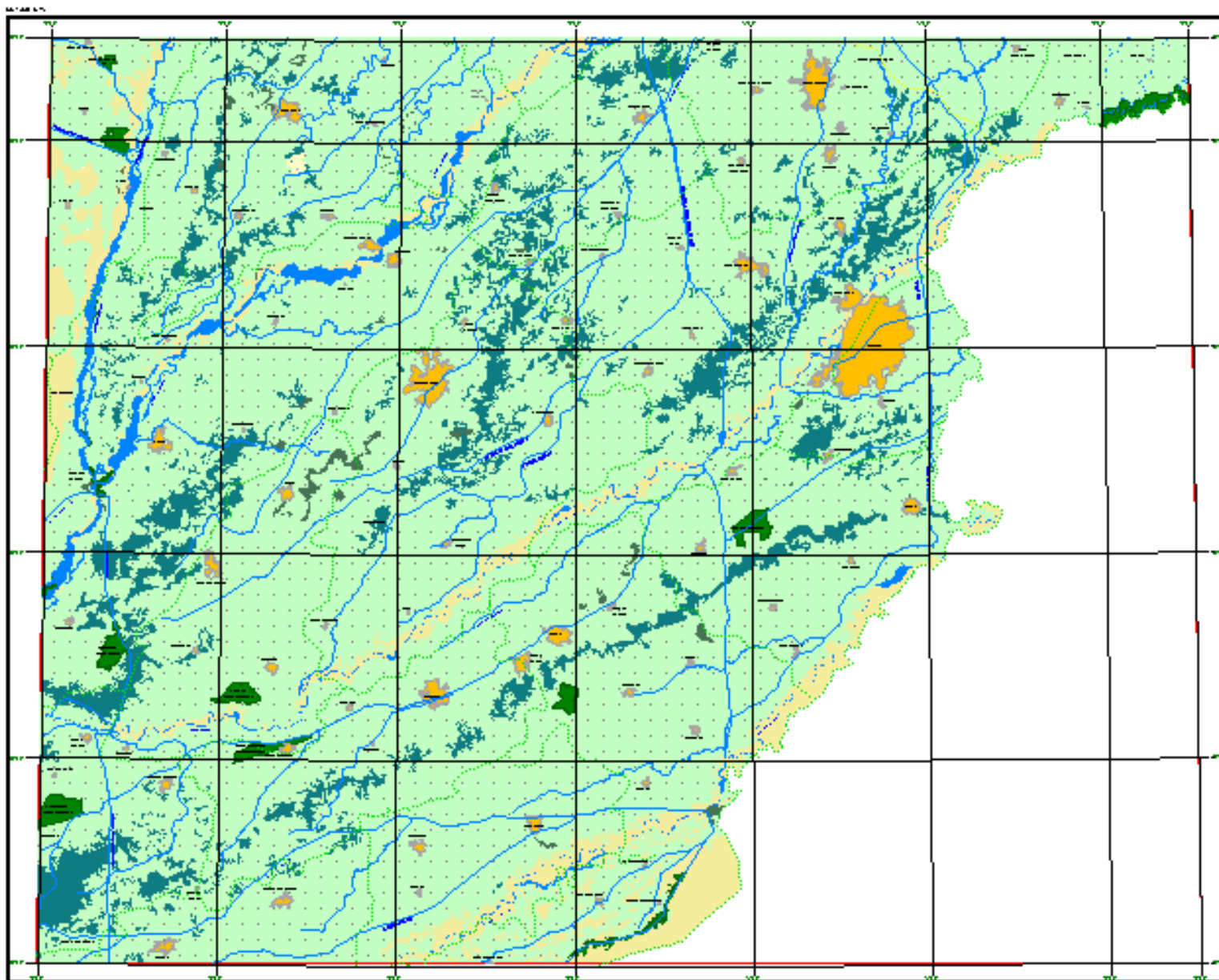
To determine battery overcharge with change of temperature

National Landuse Plan



Extraction of Vector Layers from Images





Map Area



	water body		urban
	sea		water body
	water body		water body
	sea		water body

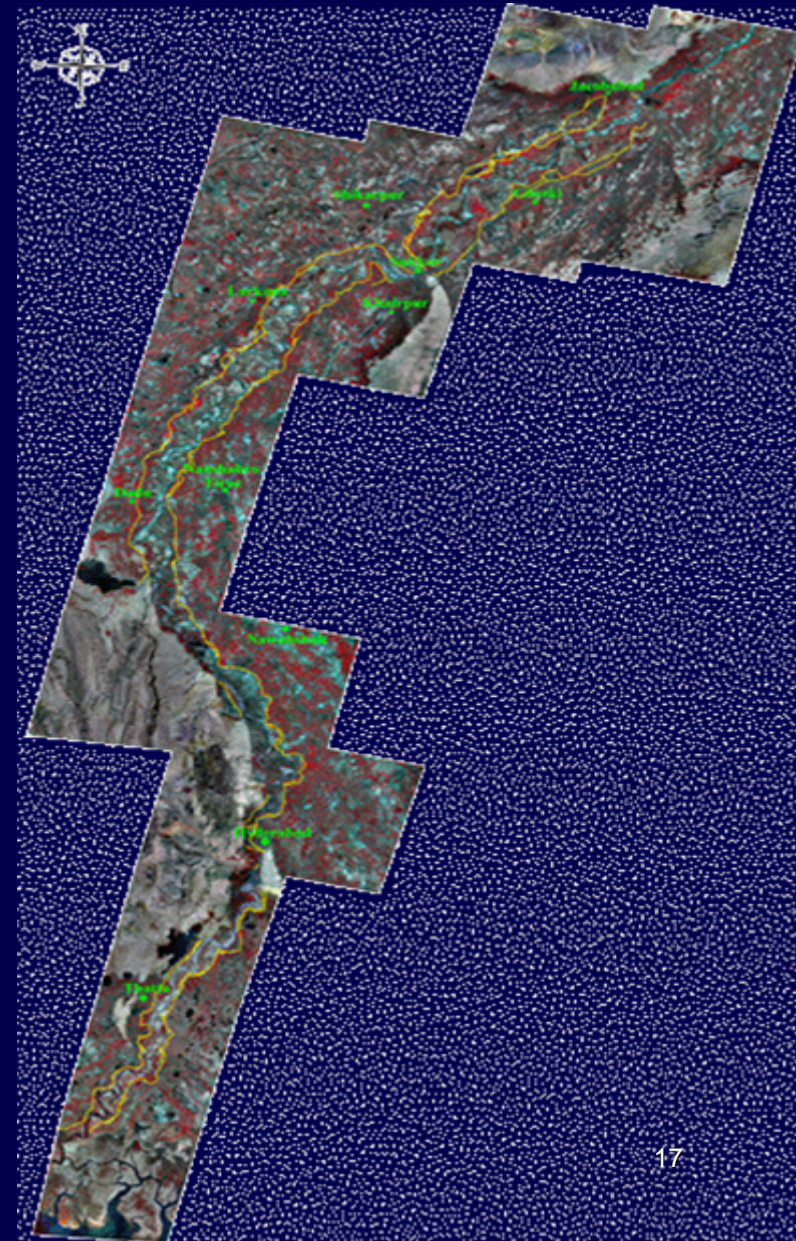


NHIP

Spot Mosaic of Indus Flood Plain

Kachho Areas in Sindh

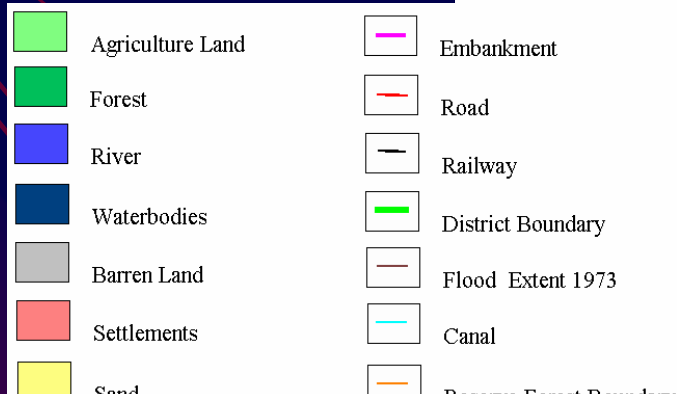
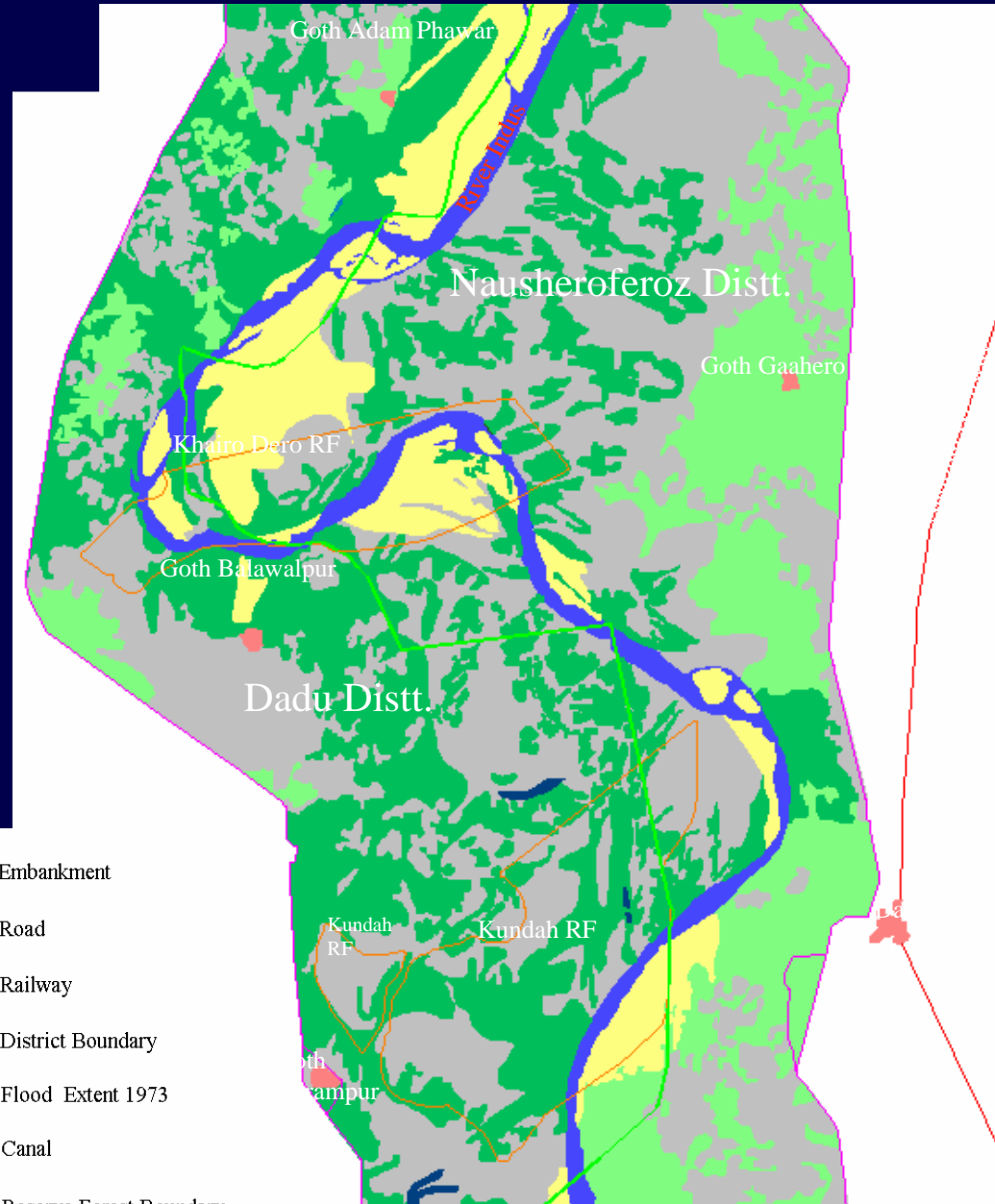
Landsat Mosaic of Pakistan



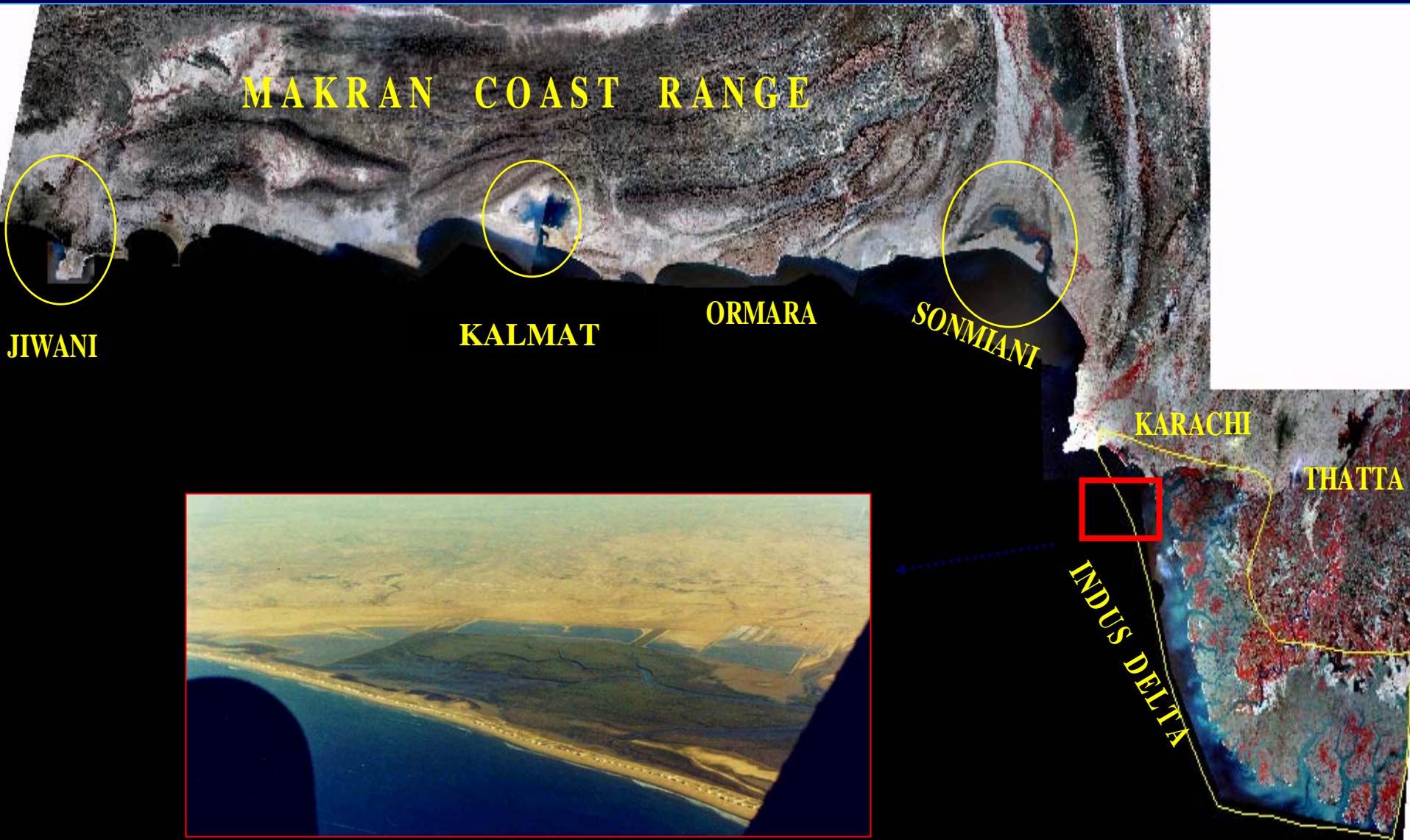
Crops and Forest in Indus Flood Plain



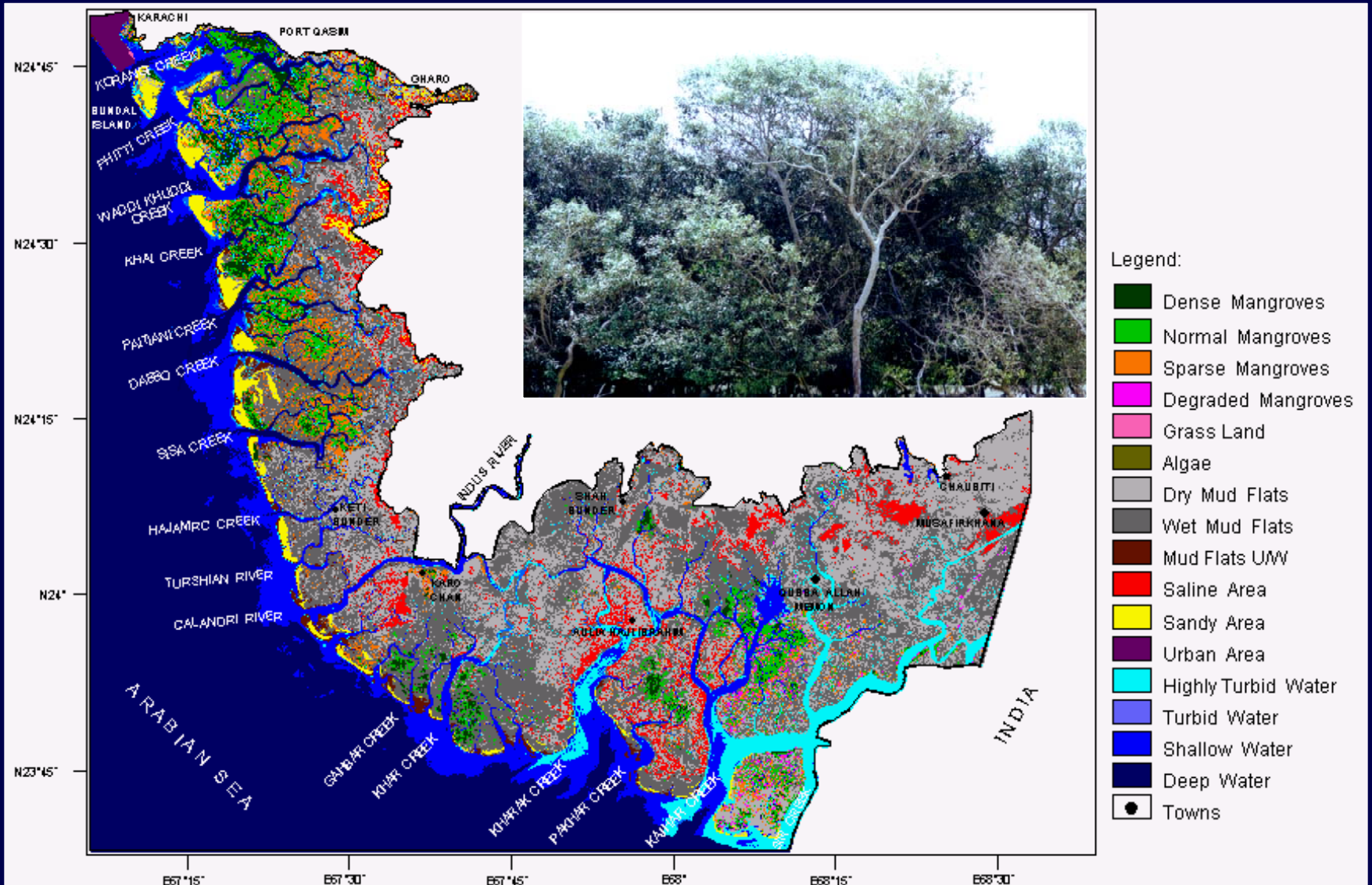
Map of Indus Flood Plain Kachho Areas



Mangrove Forests along the Coast of Pakistan



Thematic Map of Mangrove Forests *Indus Delta*



Mangrove afforestation in Indus Delta

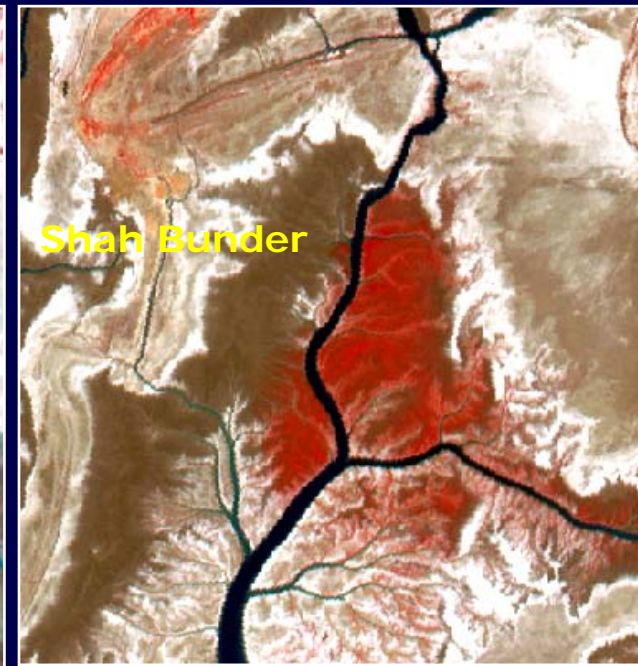
Shah Bunder



Landsat TM - 1989



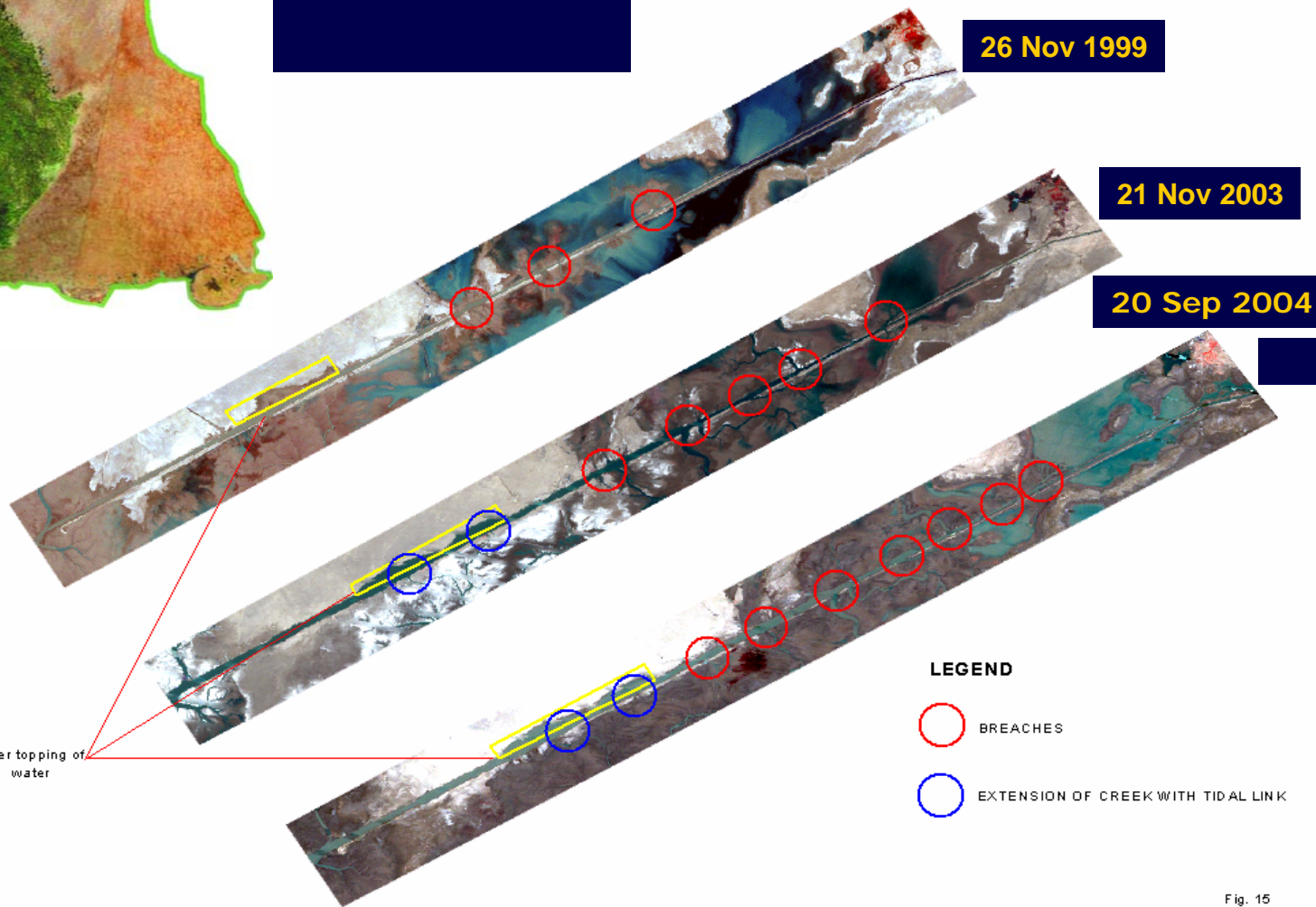
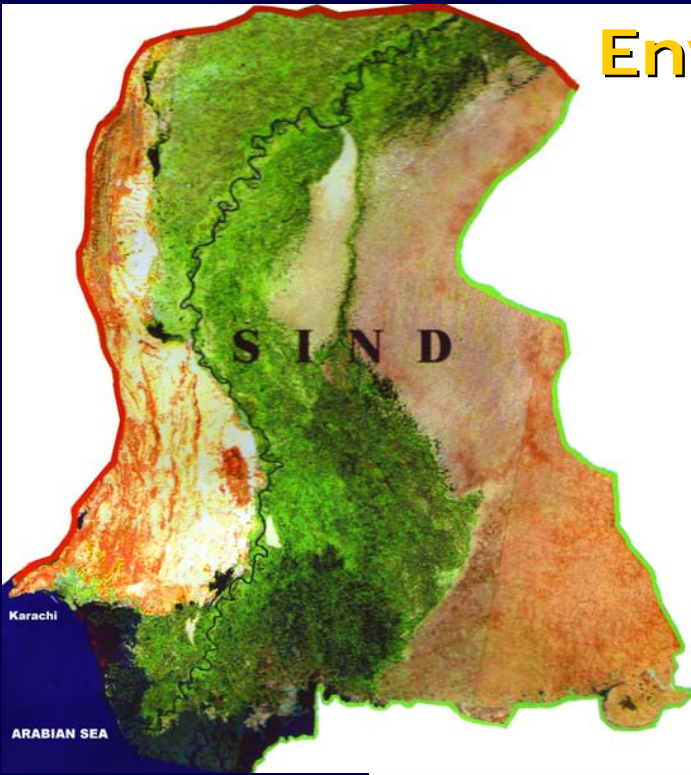
Landsat TM - 1998



SPOT XS - 2003

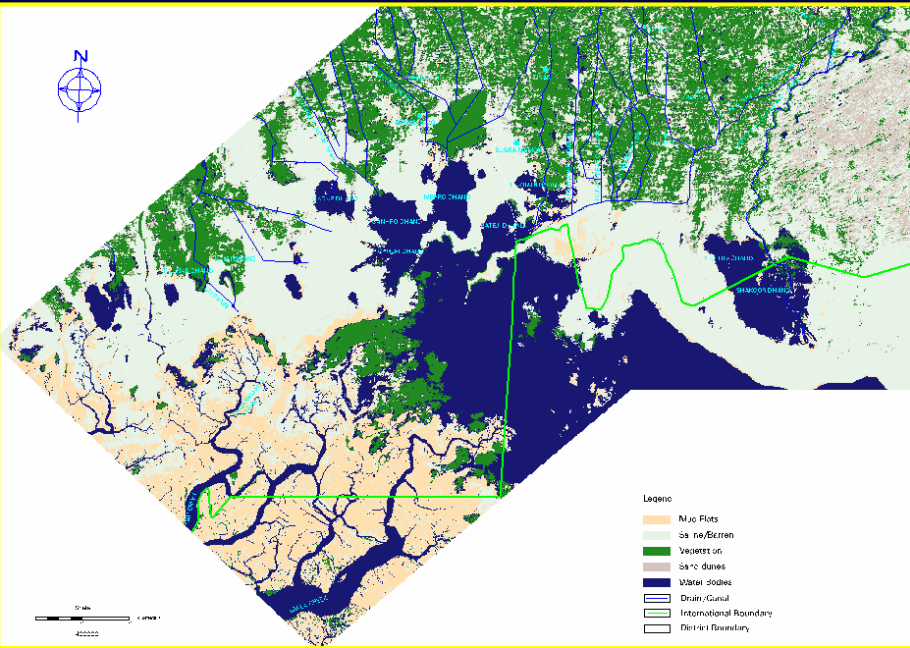
Environmental Impact Assessment

Thatta & Badin Distt, Sindh

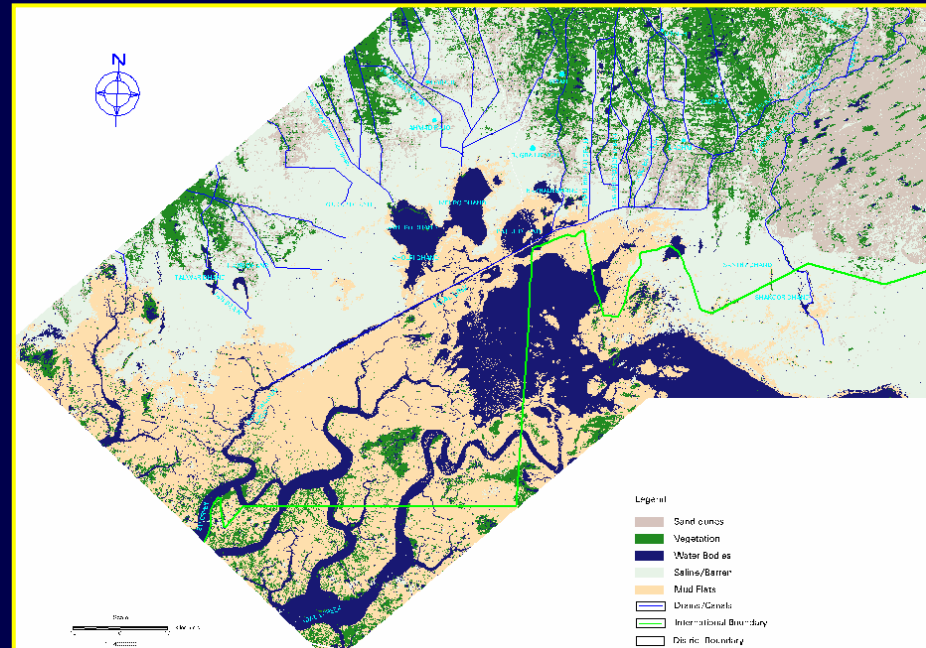


- LEGEND**
- BREACHES
 - EXTENSION OF CREEK WITH TIDAL LINK

Environmental Deterioration



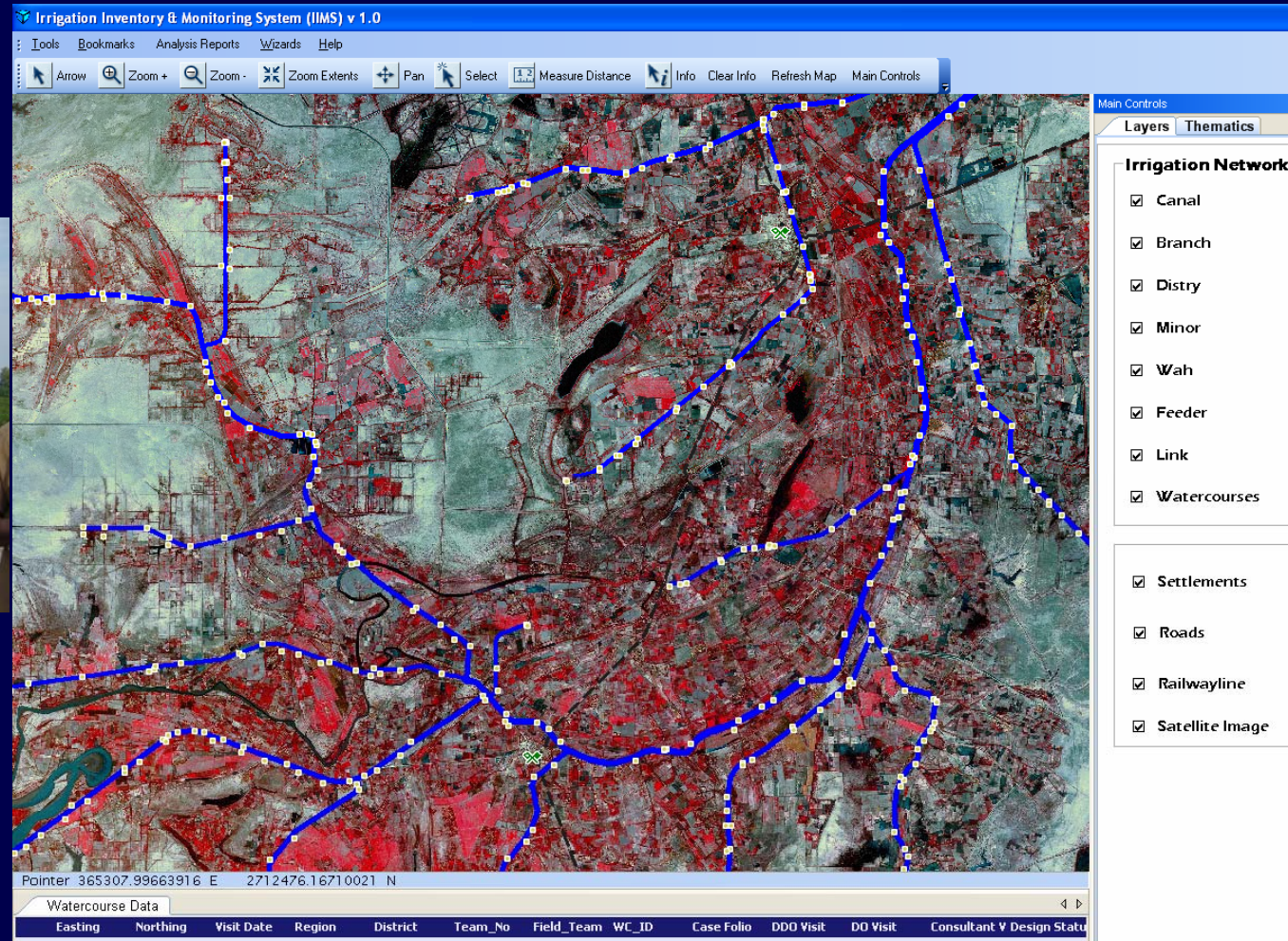
1989



2004

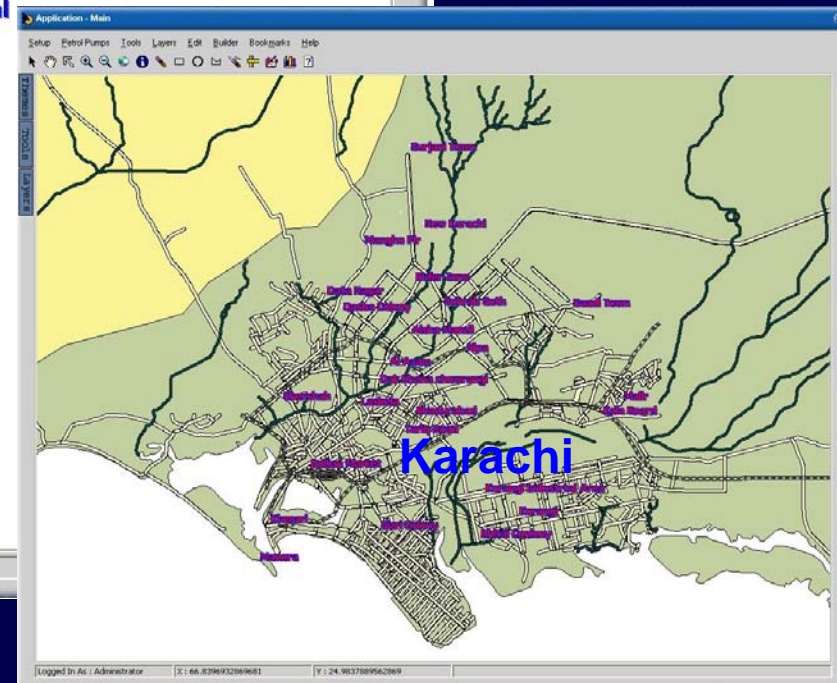
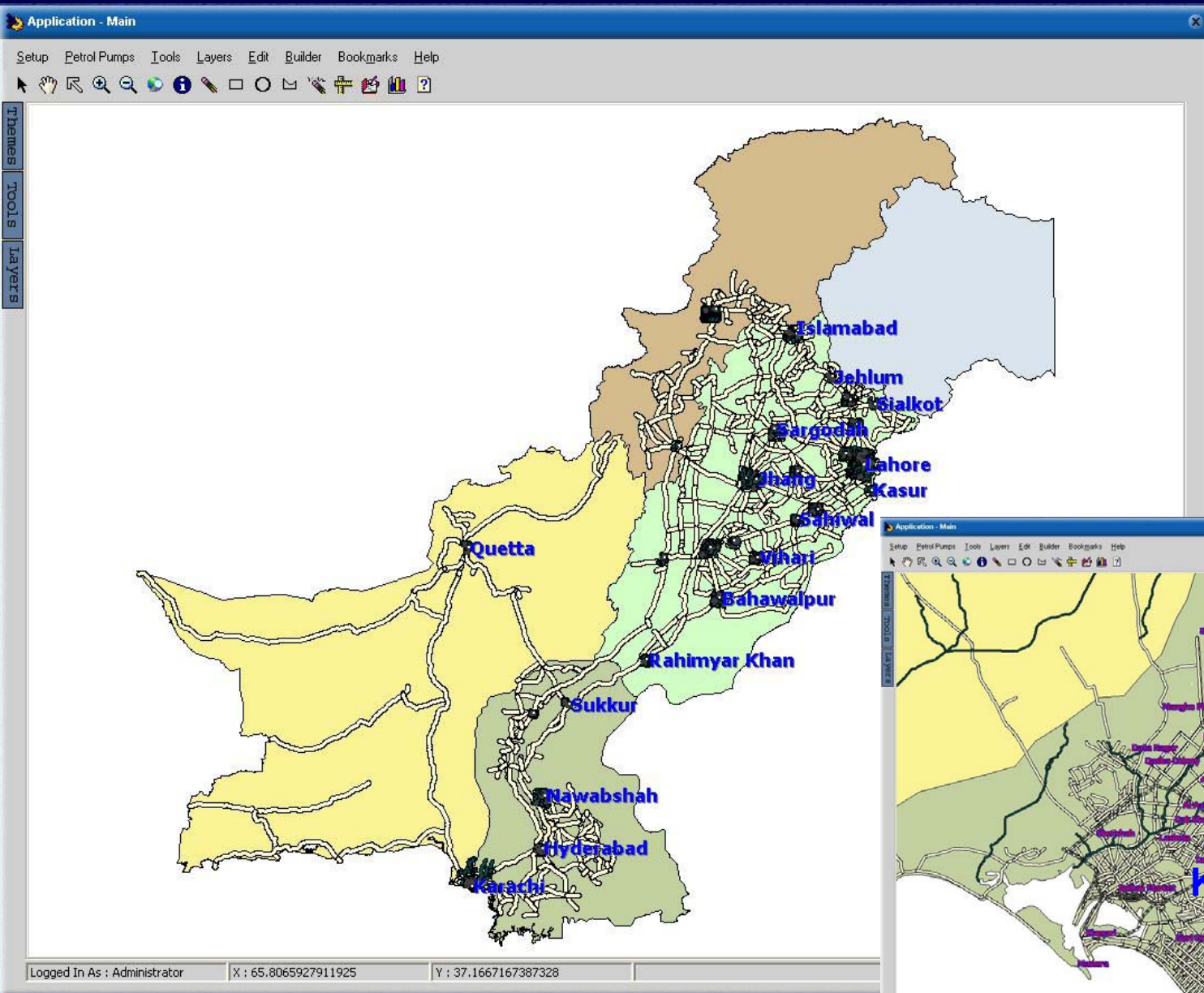
Monitoring Watercourses Improvement Work in Sindh

Establ of Geodatabase, Hardware, Software and Tracking System



- Development of a reliable database of more than 40,000 watercourses in Sindh
- Incorporation of new developments in existing irrigation network using satellite images and GSM/GPRS based field monitoring instrument
- Quick access, searching and analysis through customized GIS for planning and management
- Transparency in Monitoring System
- Sharing of database between PMU Headquarter and its regional offices

Development of GIS for PSO Control Centre



Crop Monitoring thru Satellite Remote Sensing

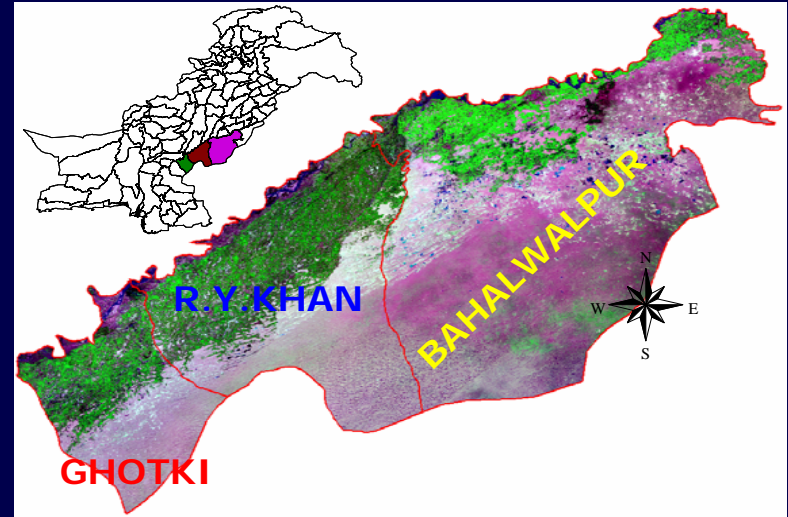
Client:

Min of Food & Agriculture

Scope of Work:

- Exploiting Remote Sensing and GIS technologies to forecast crop yield (cotton and wheat crops)
- Verification of Satellite based information on various crop parameters through extensive field survey

PROJECT AREA



DAM Site Selection

Client:

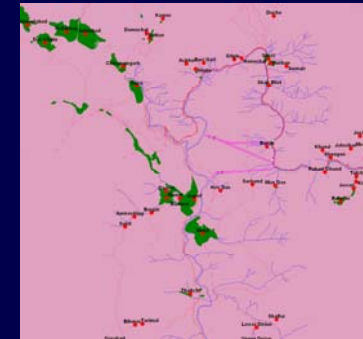
WAPDA

Scope of Work:

- Satellite Data Analysis for Dam Site Selection
- Extraction of GIS Layers (Road, Drainage, Water bodies, Built up areas, crop land, Forest, Barren Land), Shaded Relief Map, Digital Elevation Model, 3D Modeling
- Training of WAPDA personnel



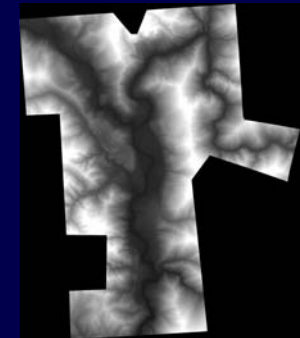
SPOT XS Data



GIS



Shaded Relief



Digital Elevation Model



3D Modeling



3D Modeling

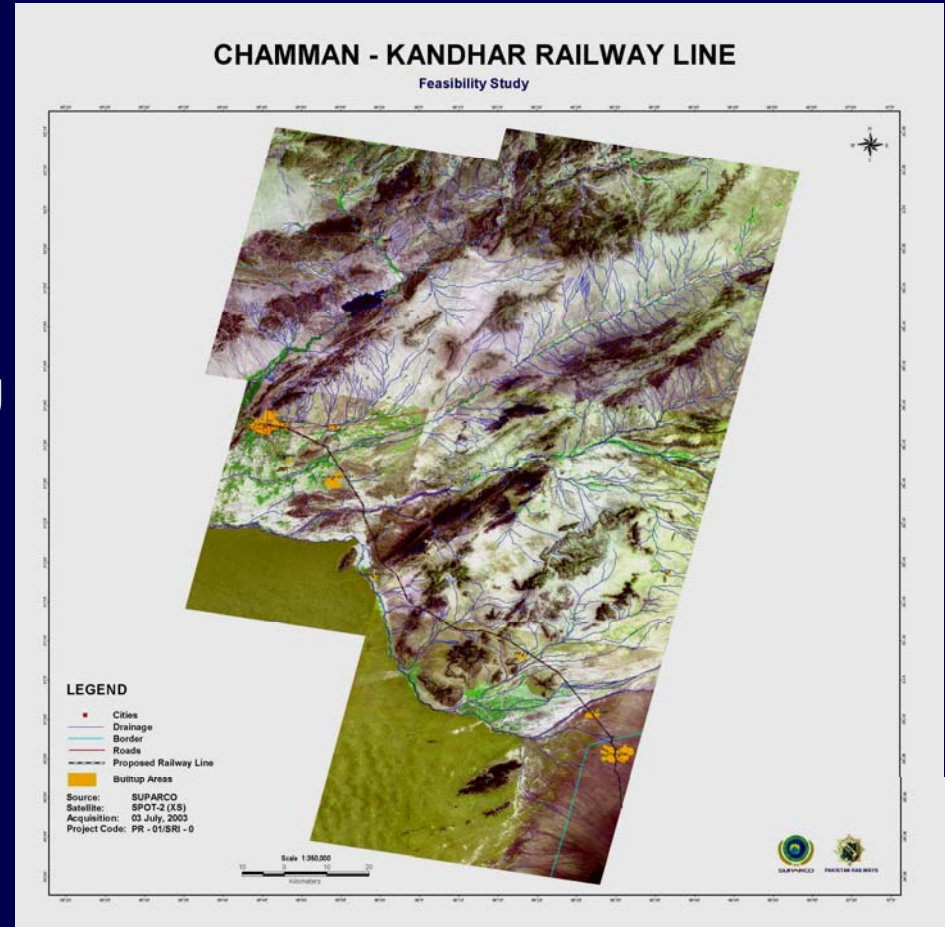
Route Selection for Chaman-Kandhar Railway Line

Client:

Pakistan Railways

Scope of Work:

- Processing and geo-referencing of satellite images
- Digitization for railway route location



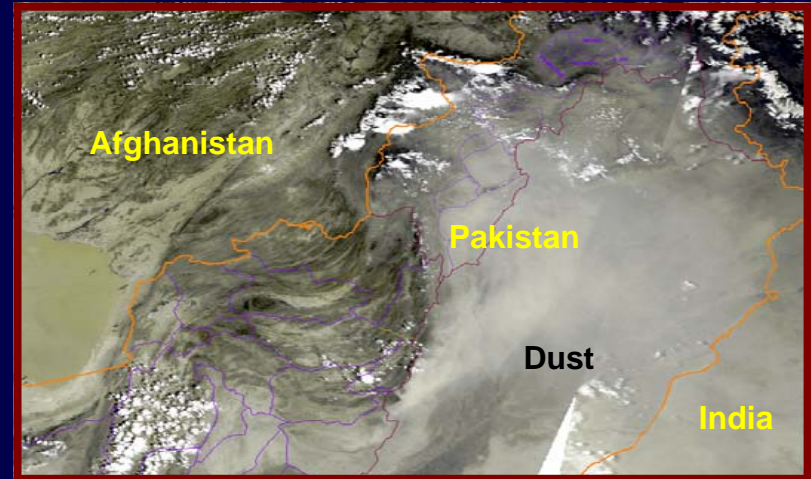
Space & Atmospheric Sciences and their Applications



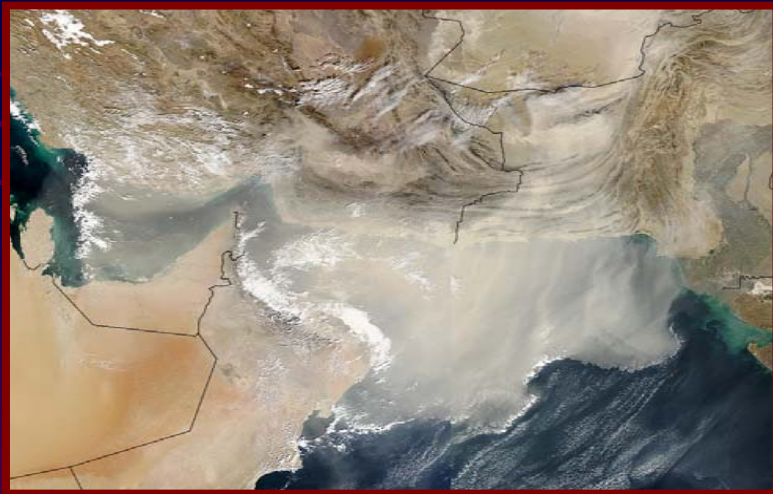
Dust Storm Study

Scope of Work:

- Use of Earth Observing Satellites (EOS) data and GIS technique for dust storms study



22 May 2006



13 December 2003



7 June 2003

Earthquake Study

Scope of Work:

- Use of Satellites data and GIS techniques for assessment of post disaster damages



Major Landslides in Muzaffarabad
Earthquake on 8th Oct, 2005



Islamabad: Satellite Image of Collapsed Margala Tower due
to October 08, 2005 Earthquake.