JICA/MEPA Workshop III

"Sampling Practice"

Khalid Al-Rasheed

MEPA & JICA Project

SEA WATER QULAITY & MONITORING OF ARABIAN GULF

Sampling Practices

Khaled S. Al-Rasheed

The Need for The Study

- **The area along the Arabian Gulf has been developed rapidly causing:**

  1. Environmental deterioration from water pollution.

  2. Waste Water discharges from industries.

  3. Excessive nutrients and bacteria from sewage outfalls, urban drains, fishing boats and residential areas.

  4. Dredging and reclamation of shallow sea areas has gradually grown larger.

  5. Oil spills cause severe short-term and mid-term environmental degradation, as occurred during the Gulf War in 1991.

Objectives of The Study

- **To facilitate the technology transfer and training program.**
- **To examine coastal sea water quality and causes of water quality degradation along the Arabian Gulf.**
- **To review existing water quality monitoring activities by MEPA and other parties.**
- **To help develop more integrated, comprehensive and appropriate coastal water quality monitoring program.**

Project Description

First Stage:

Third Stage:

•First round of Site Work (Water Quality,

Fourth Stage:

•Second round of Site Work (Water Quality, Sediment, Tidal Flow & Plankton).

•Analysis of data collected & Satellite Photography .

•Evaluation of Results and Monitoring.

•Guideline for Water Quality Monitoring.

•Water Quality Monitoring Planning.

•Finalization of Technology Transfer.

Fifth Stage:

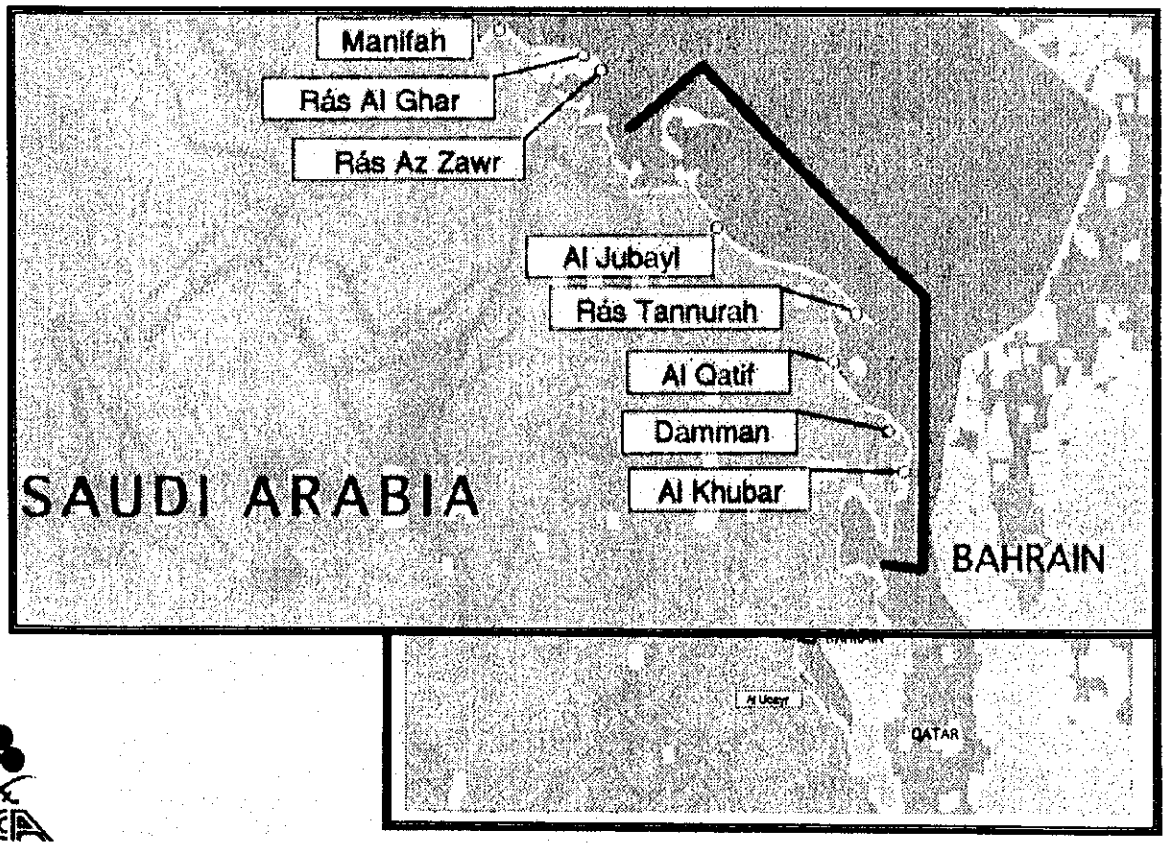
•Valuation of Technology Transfer.

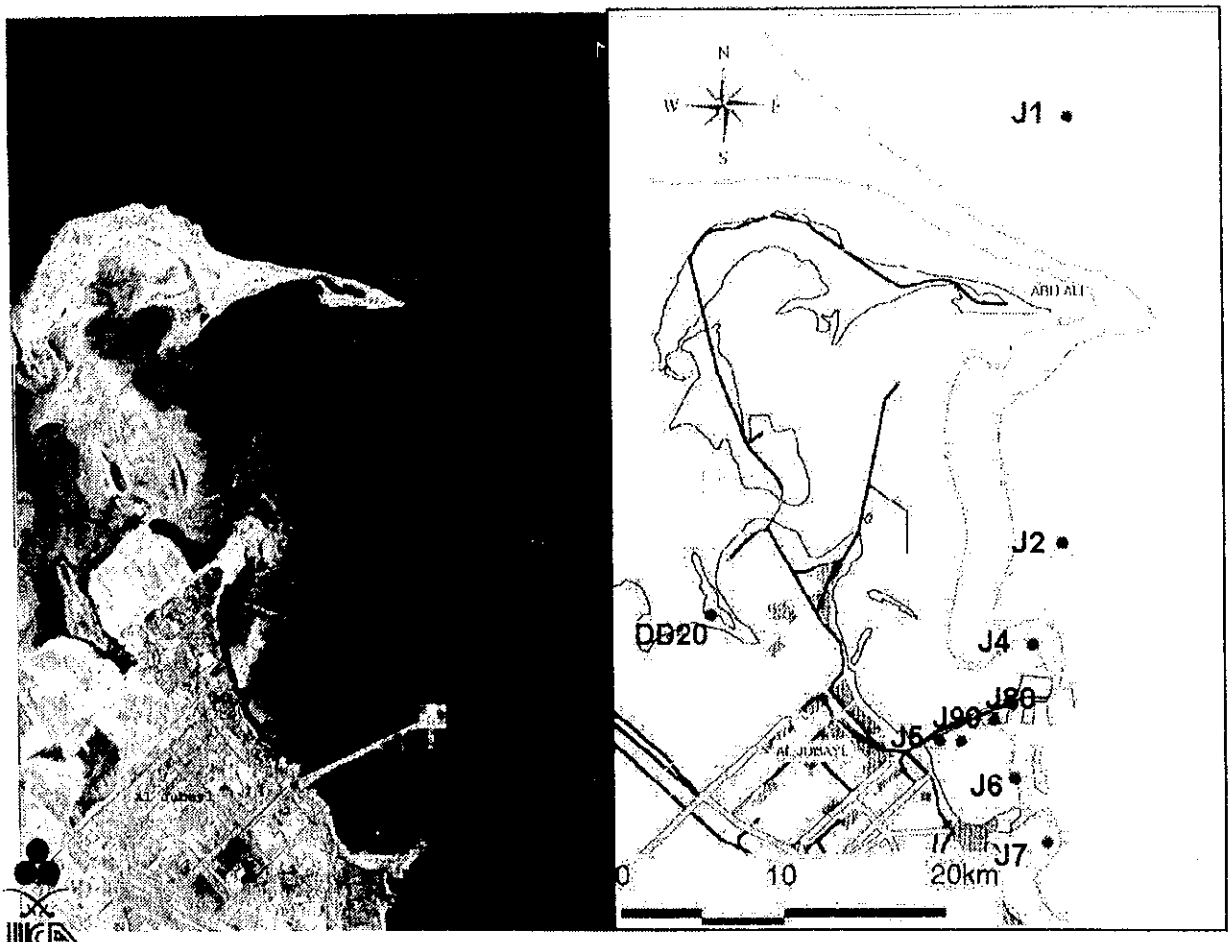
•Final Report preparation.

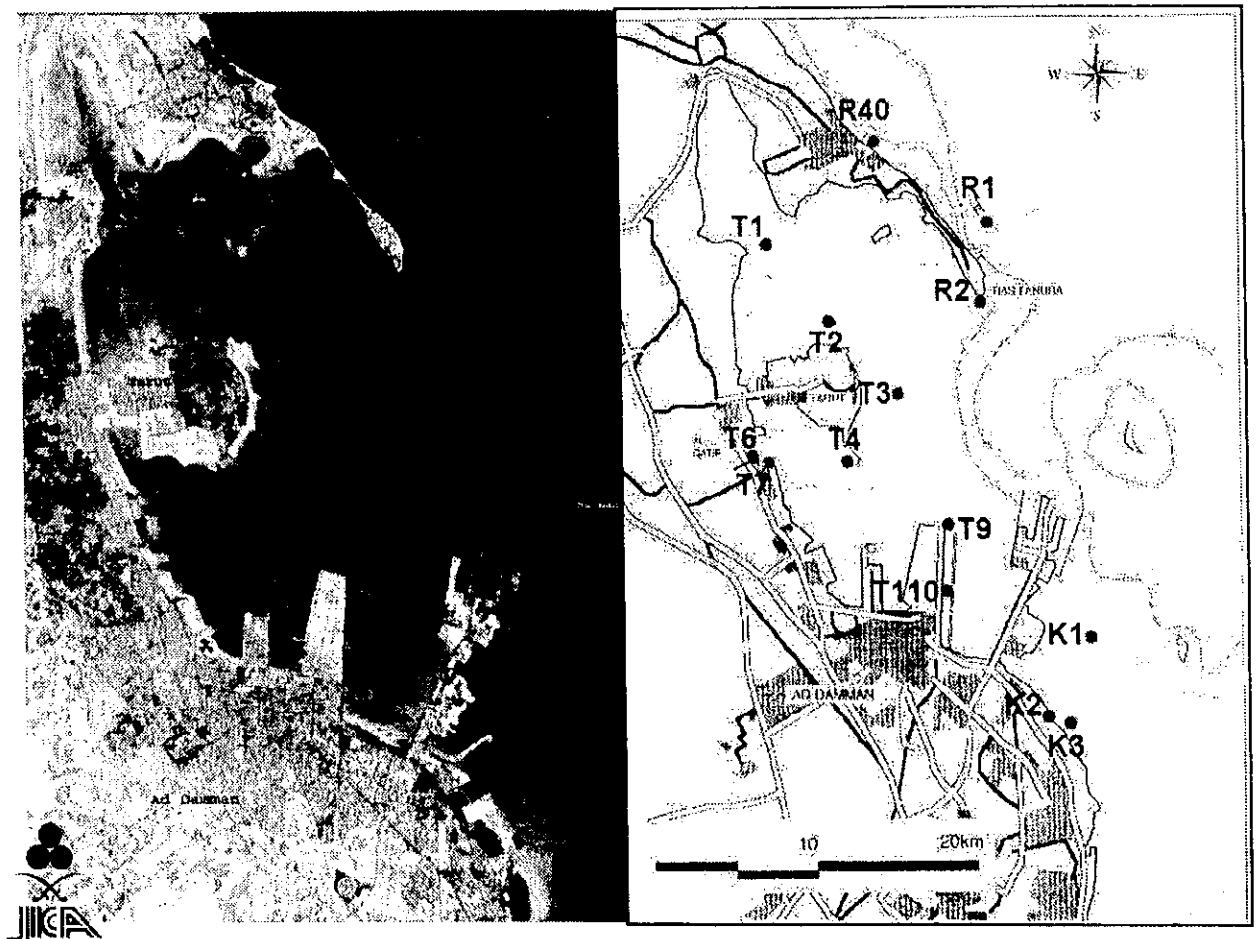
Out Line of Field Work

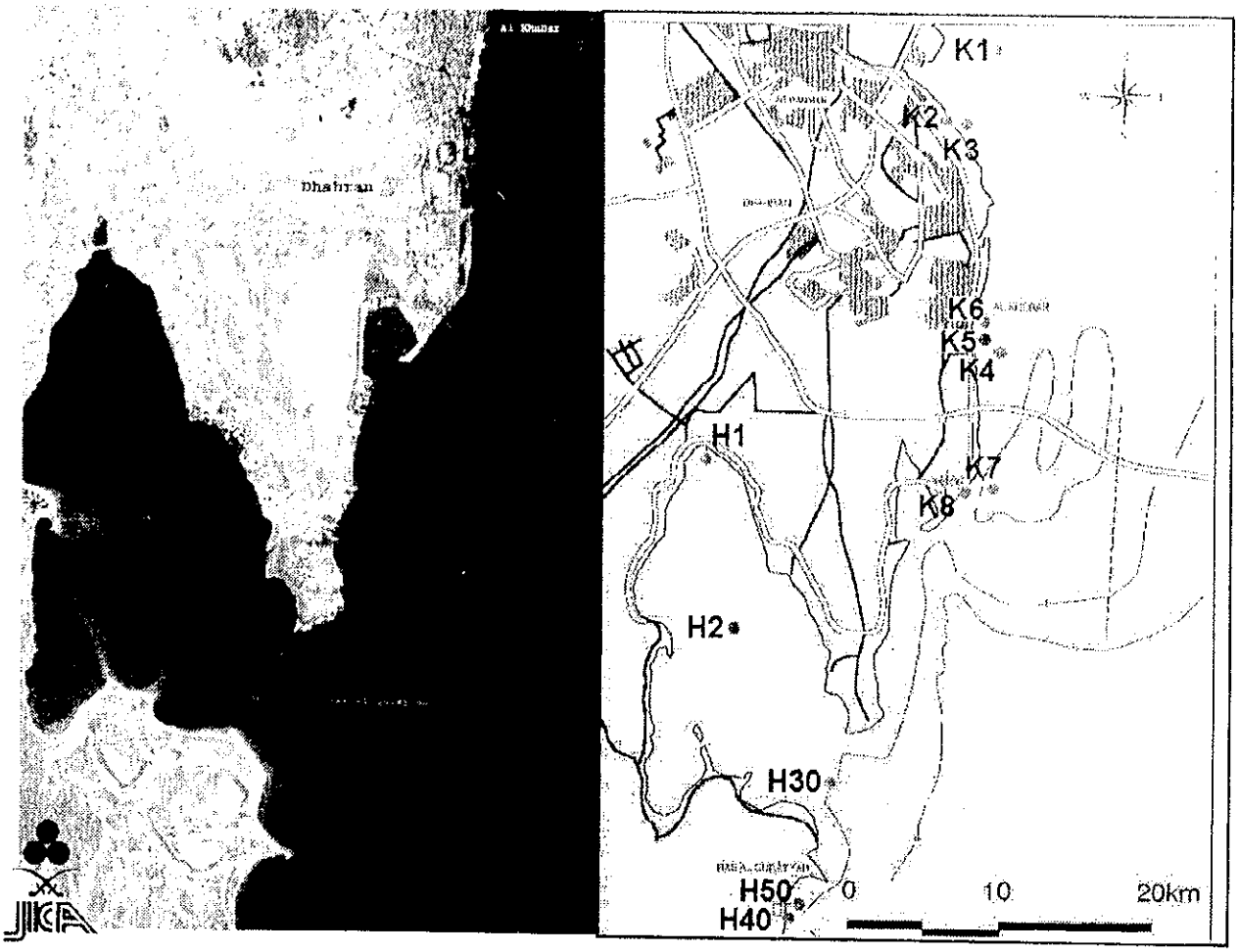
- Field Monitoring Design.
- Field Instrument Management.
- Field Data Records.
- Collection of Water & Sediment Samples.
- Data Analysis & Interpretation.

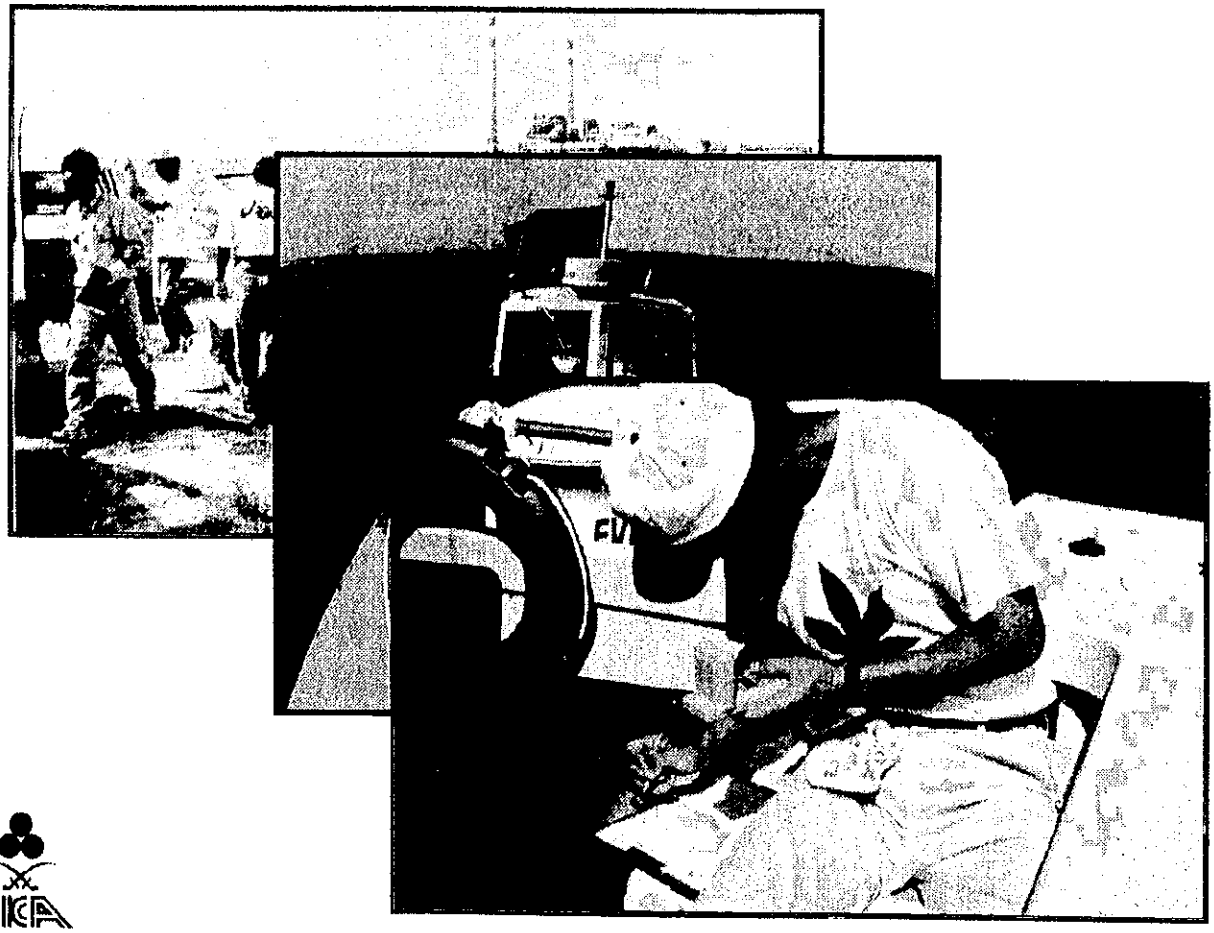
Area of the Study




N
W
E
S
J1
J2
DB20
J4
J90
J80
J5
J6
J7
0
10
20km


N
W
E
S
R40
R1
T1
R2
T2
T3
T6
T4
T5
T9
T10
K1
K2
K3
10
20km

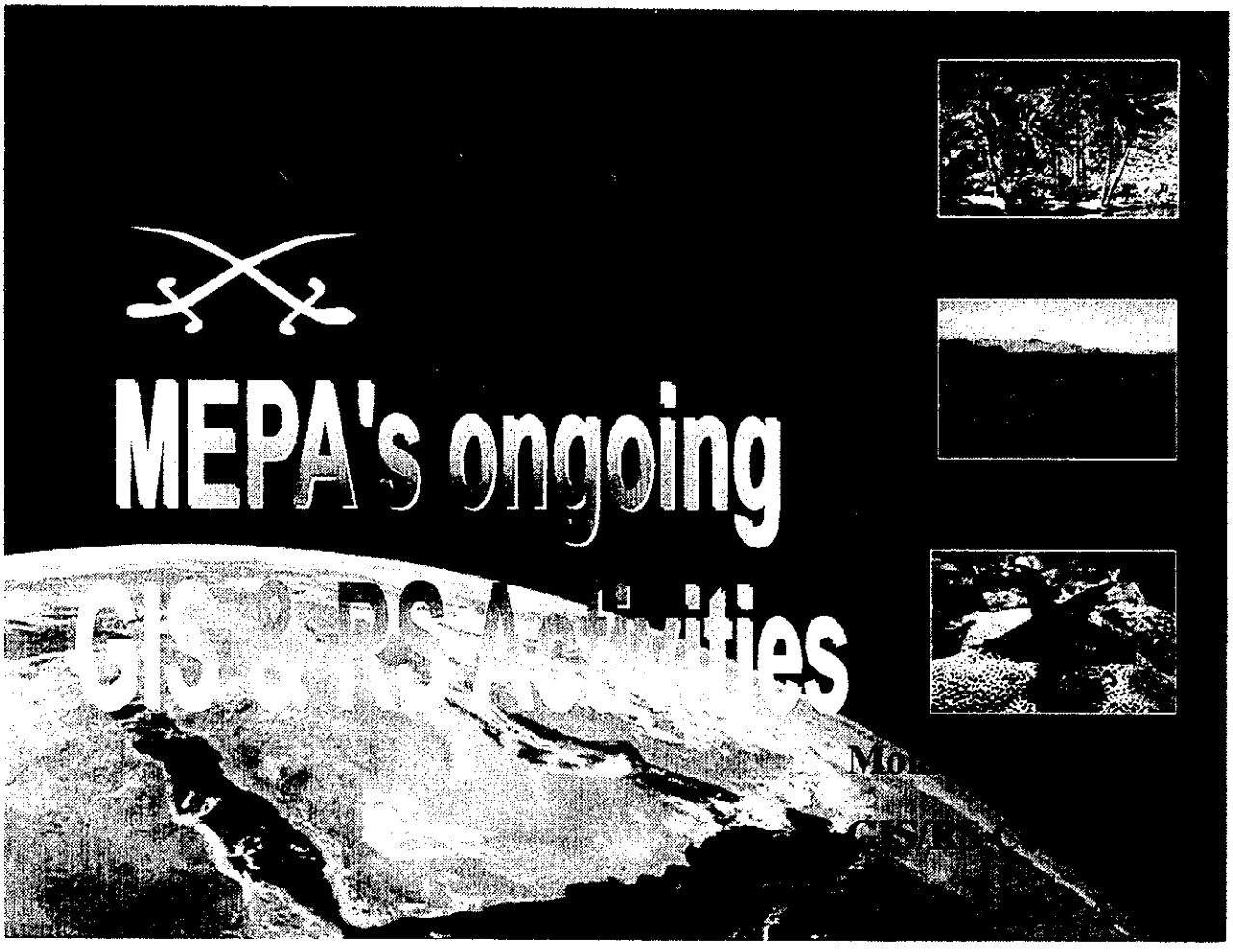

K1
K2
K3
K6
K5
K4
H1
K7
K8
H2
H30
H50
H40
0
10
20km

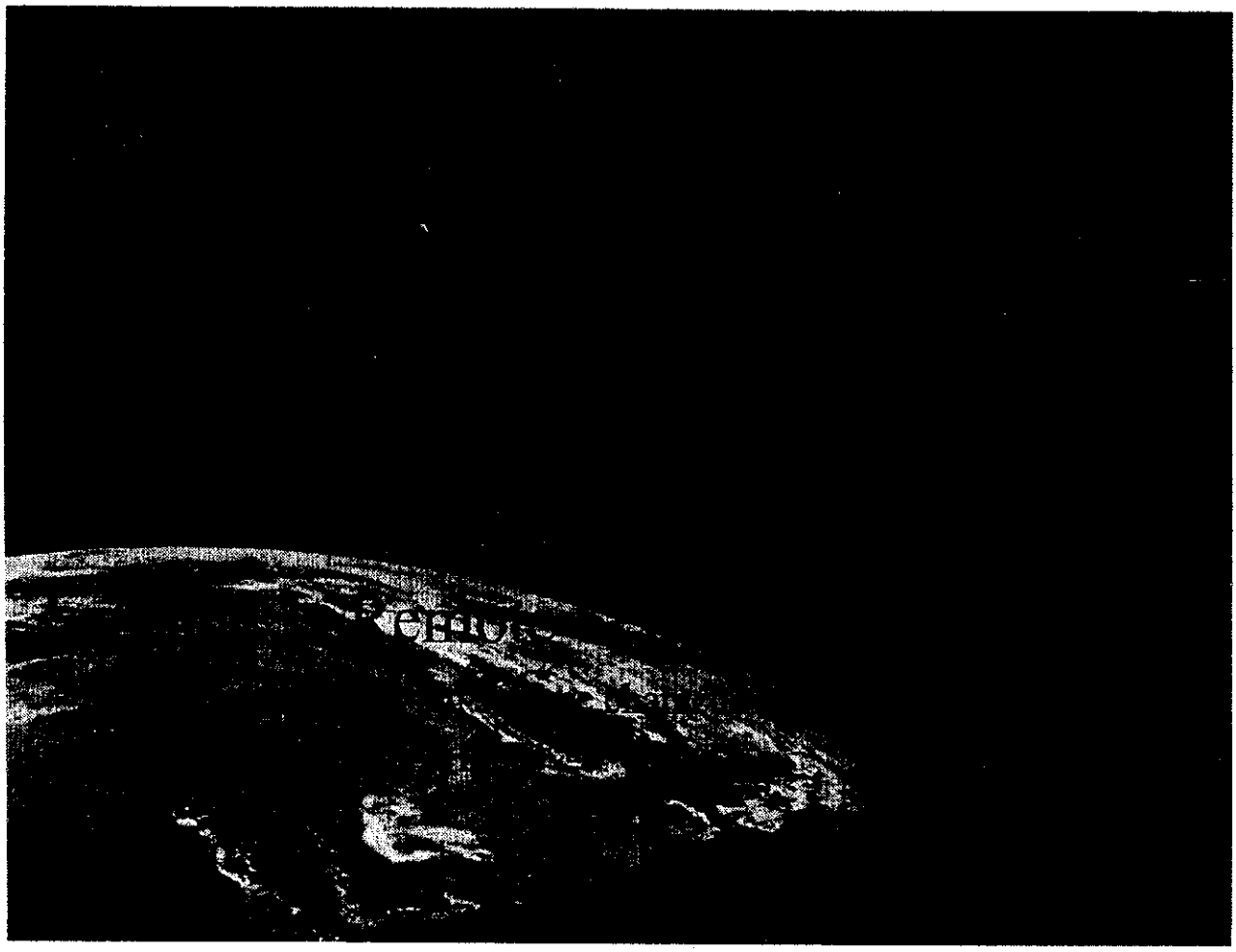


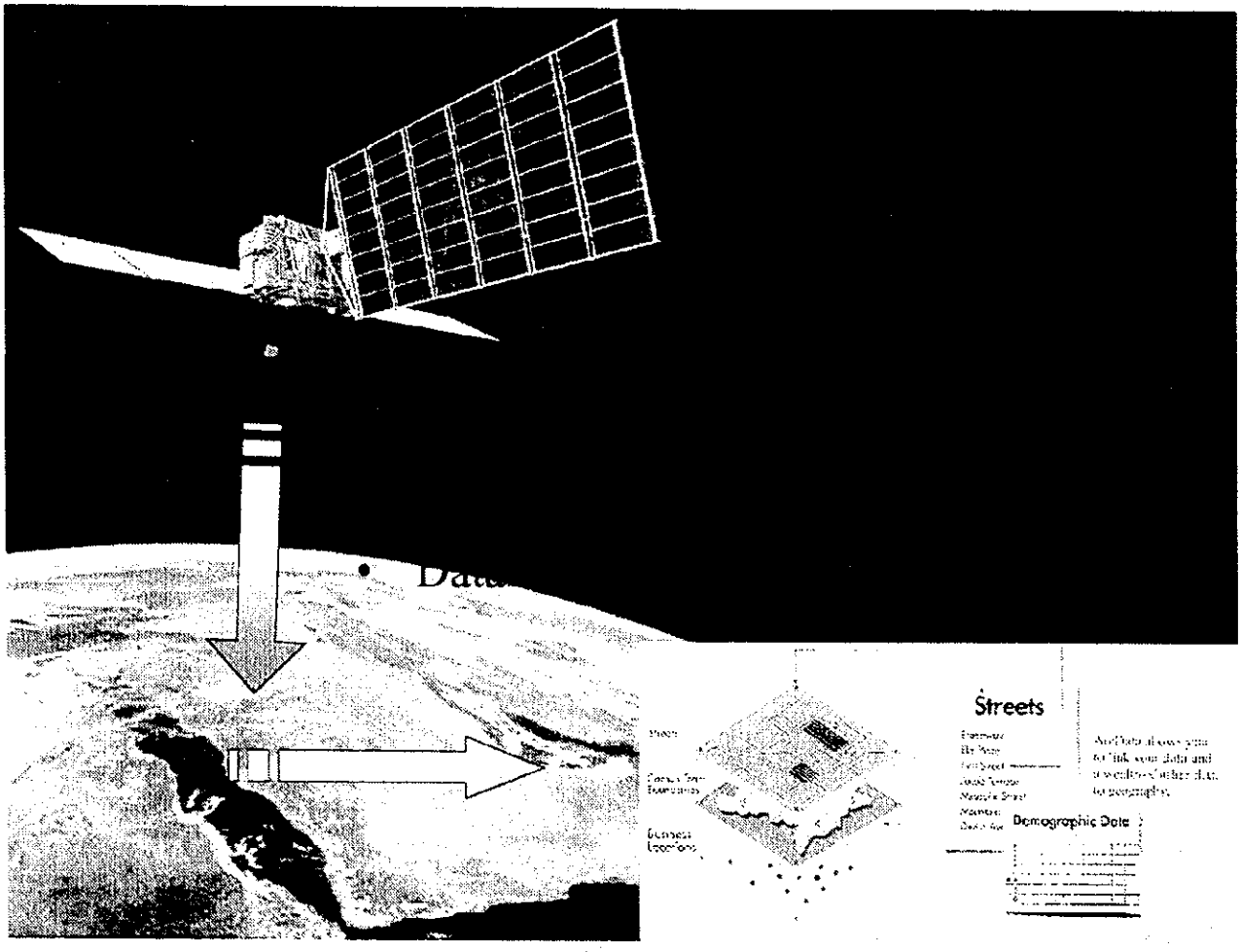
JICA/MEPA Workshop III

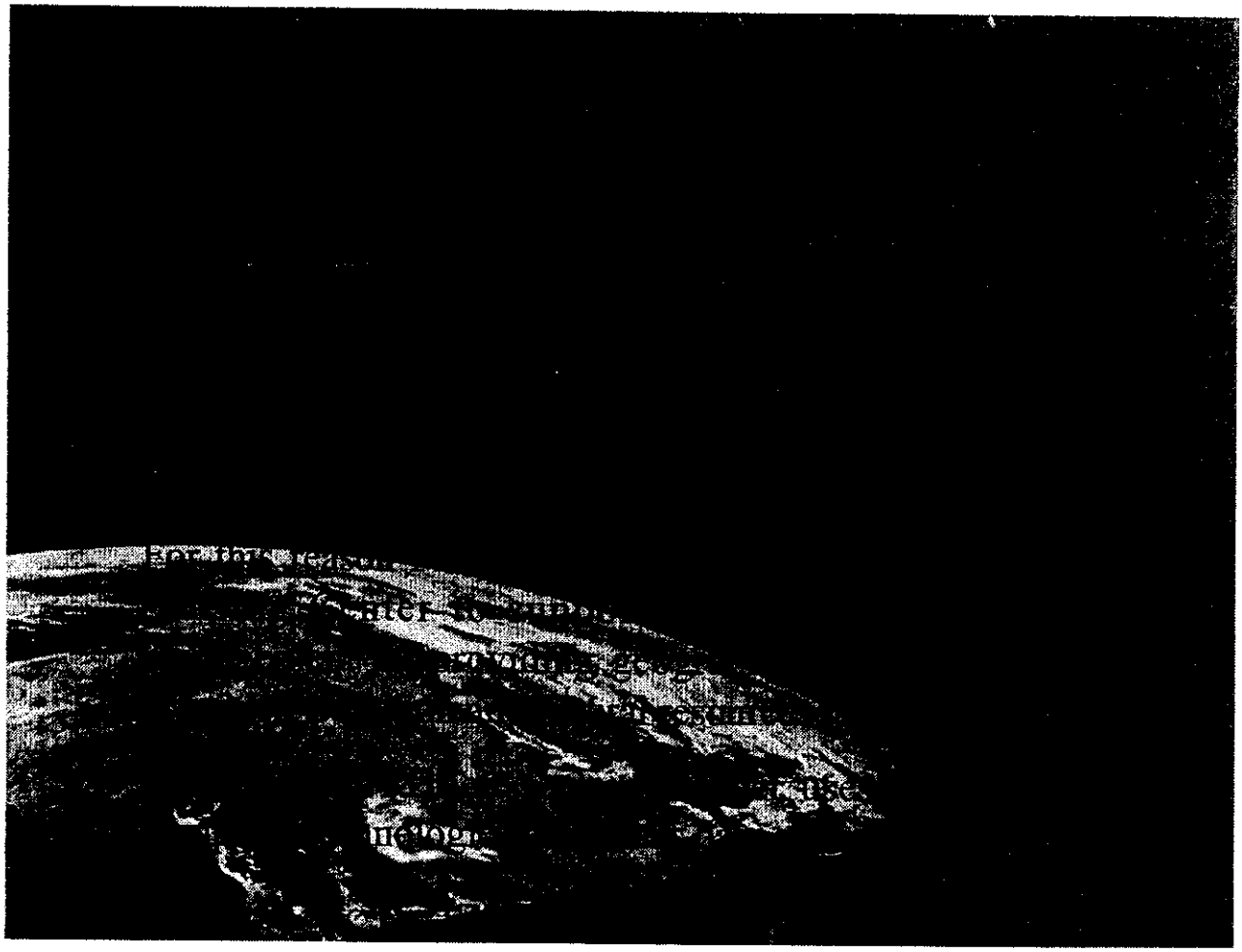
"MEPA Ongoing GIS & RS Activities"

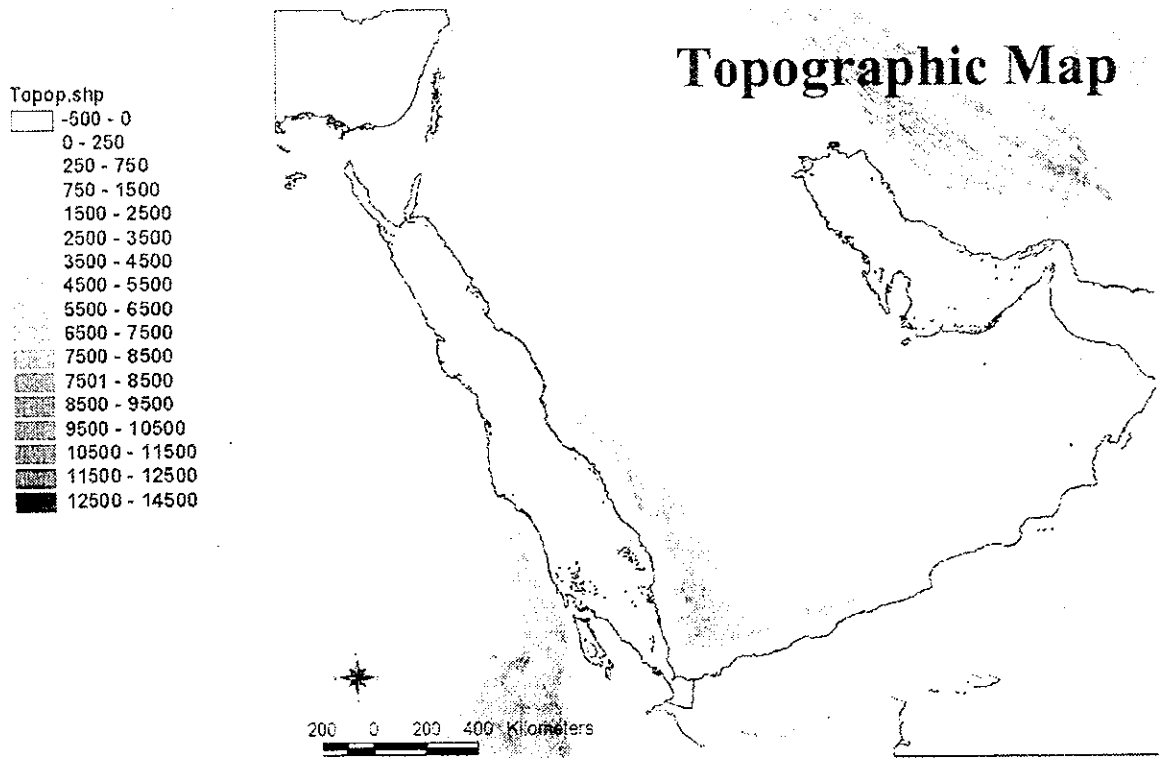
Mohammed Bukkhari

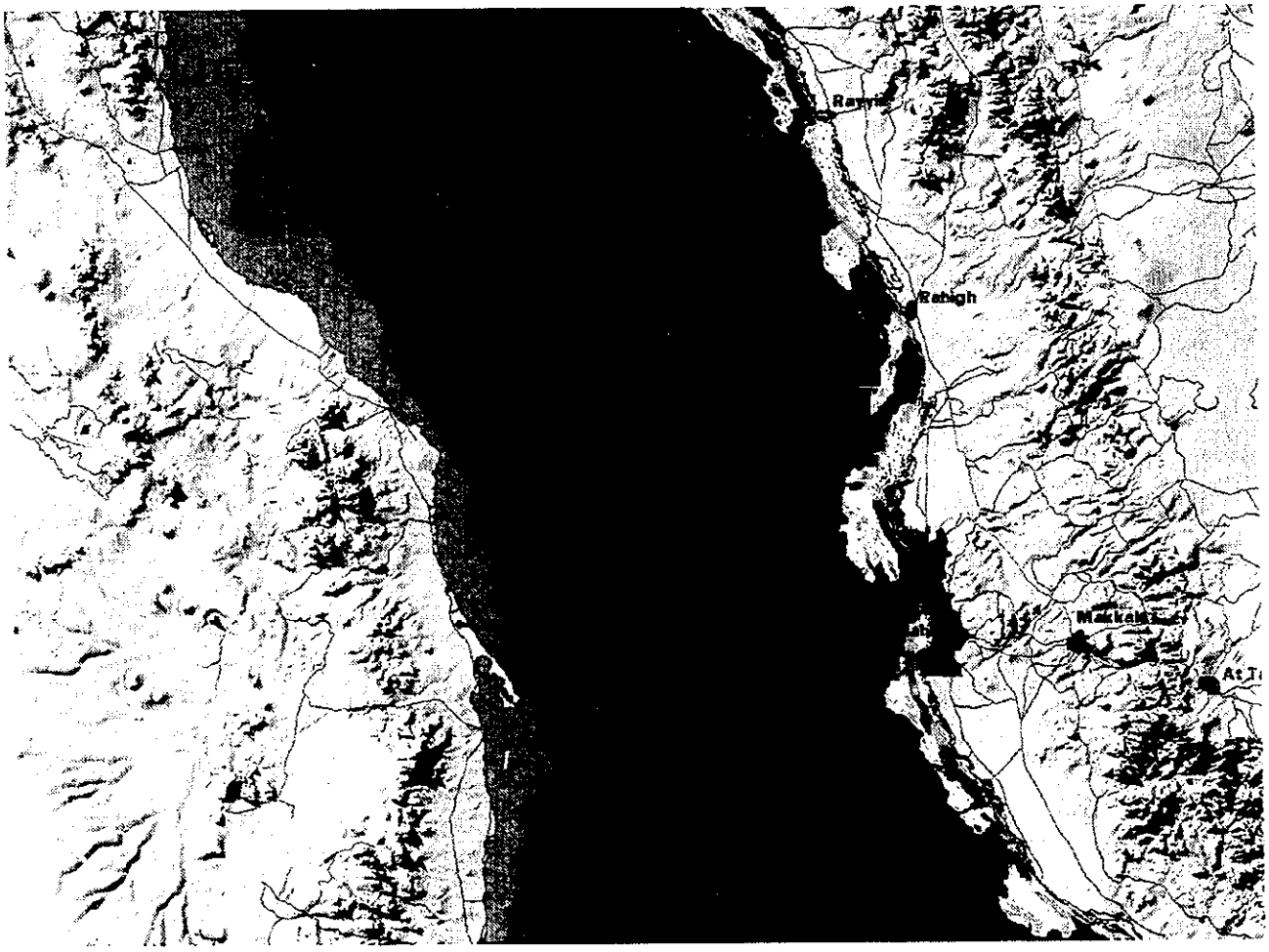

MEPA's ongoing

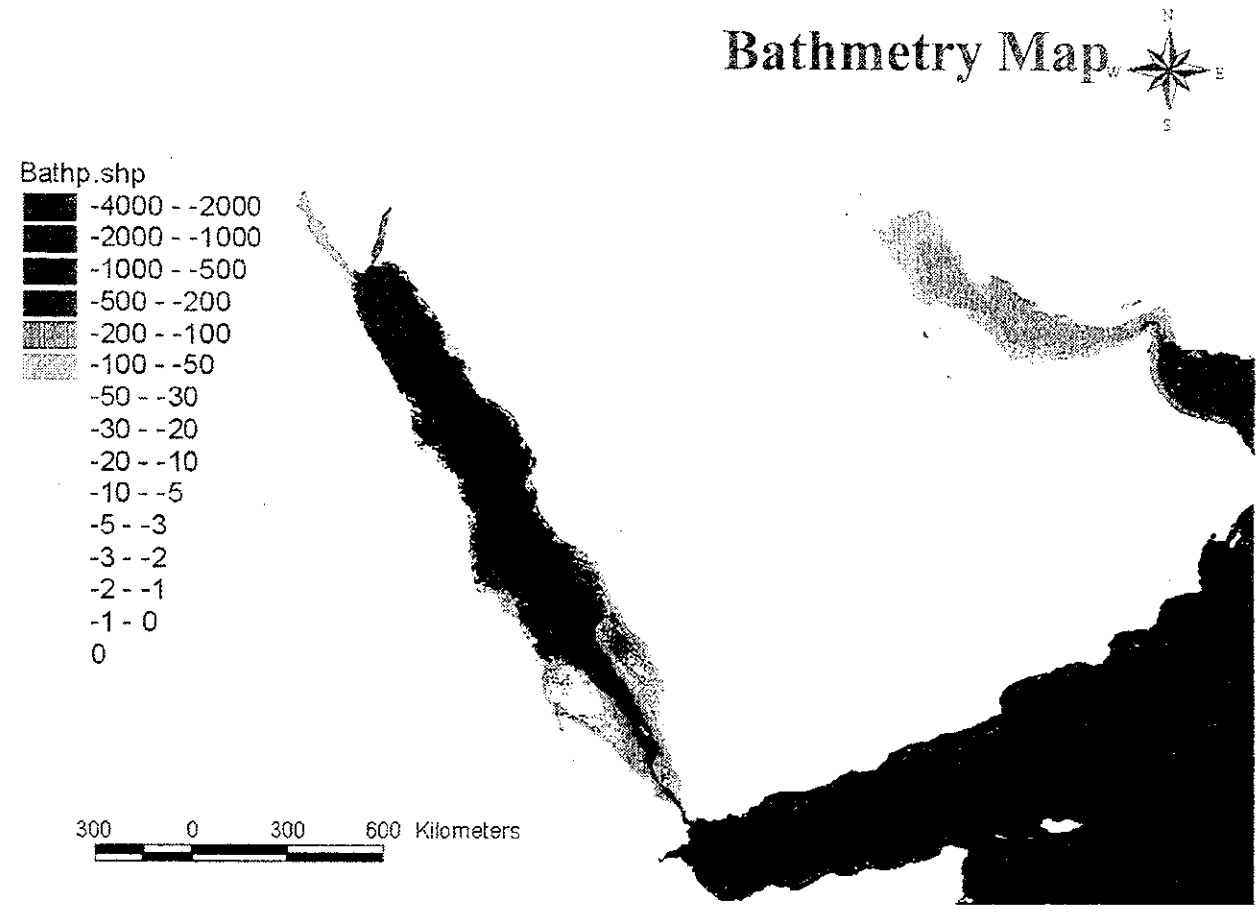


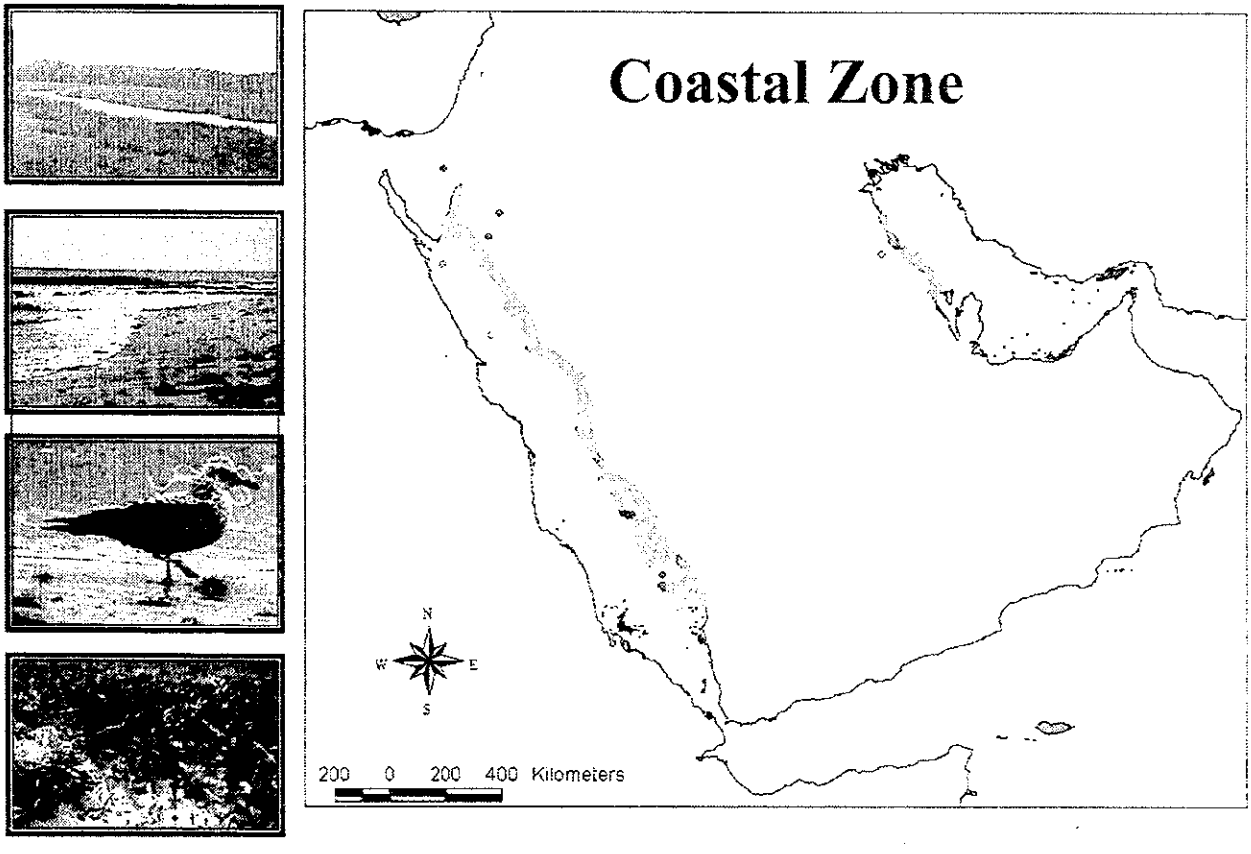

Streets
Demographic Data



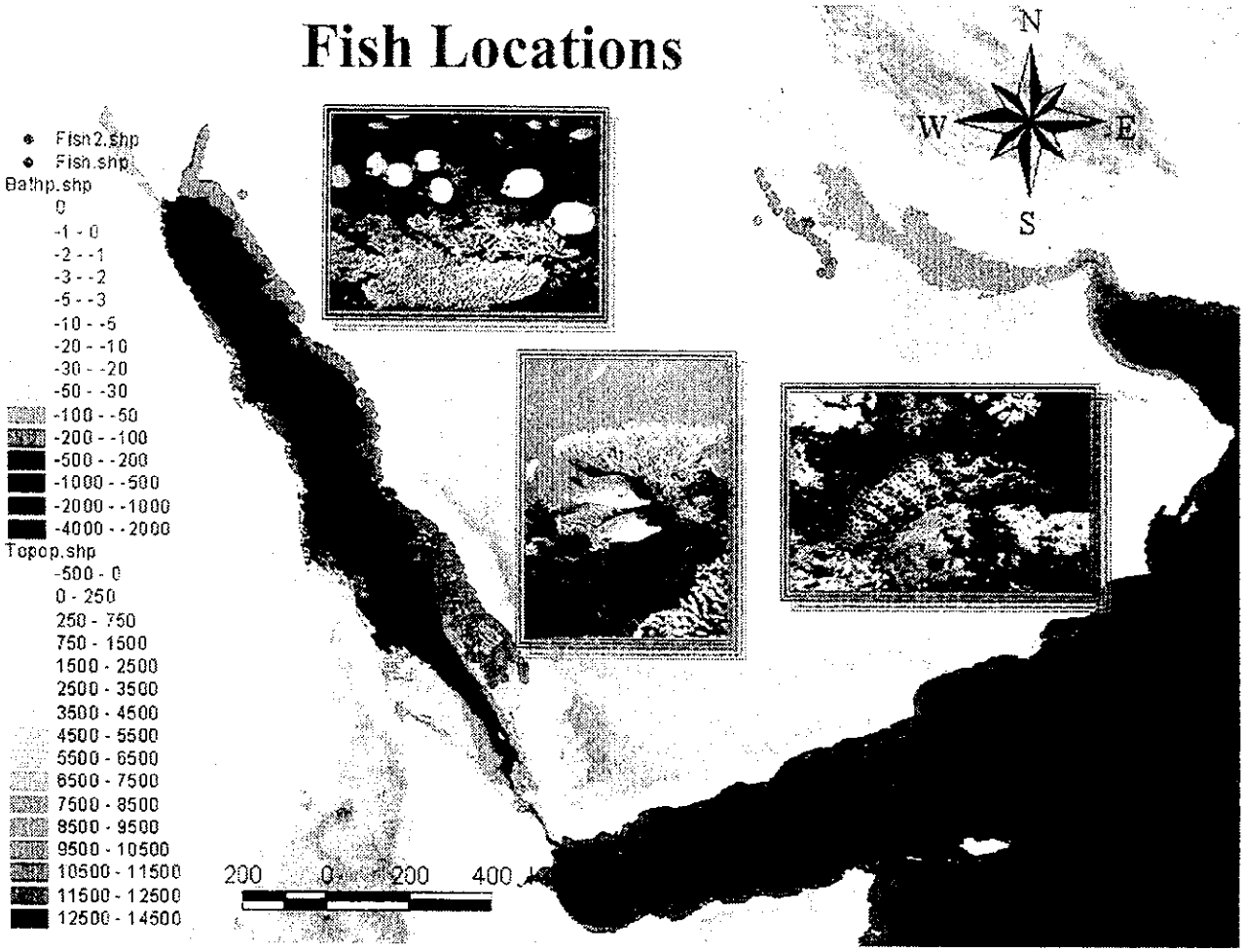

Topop.shp
-500 - 0
0 - 250
250 - 750
750 - 1500
1500 - 2500
2500 - 3500
3500 - 4500
4500 - 5500
5500 - 6500
6500 - 7500
7500 - 8500
7501 - 8500
8500 - 9500
9500 - 10500
10500 - 11500
11500 - 12500
12500 - 14500
Topographic Map
200 0 200 400 Kilometers


Rabigh

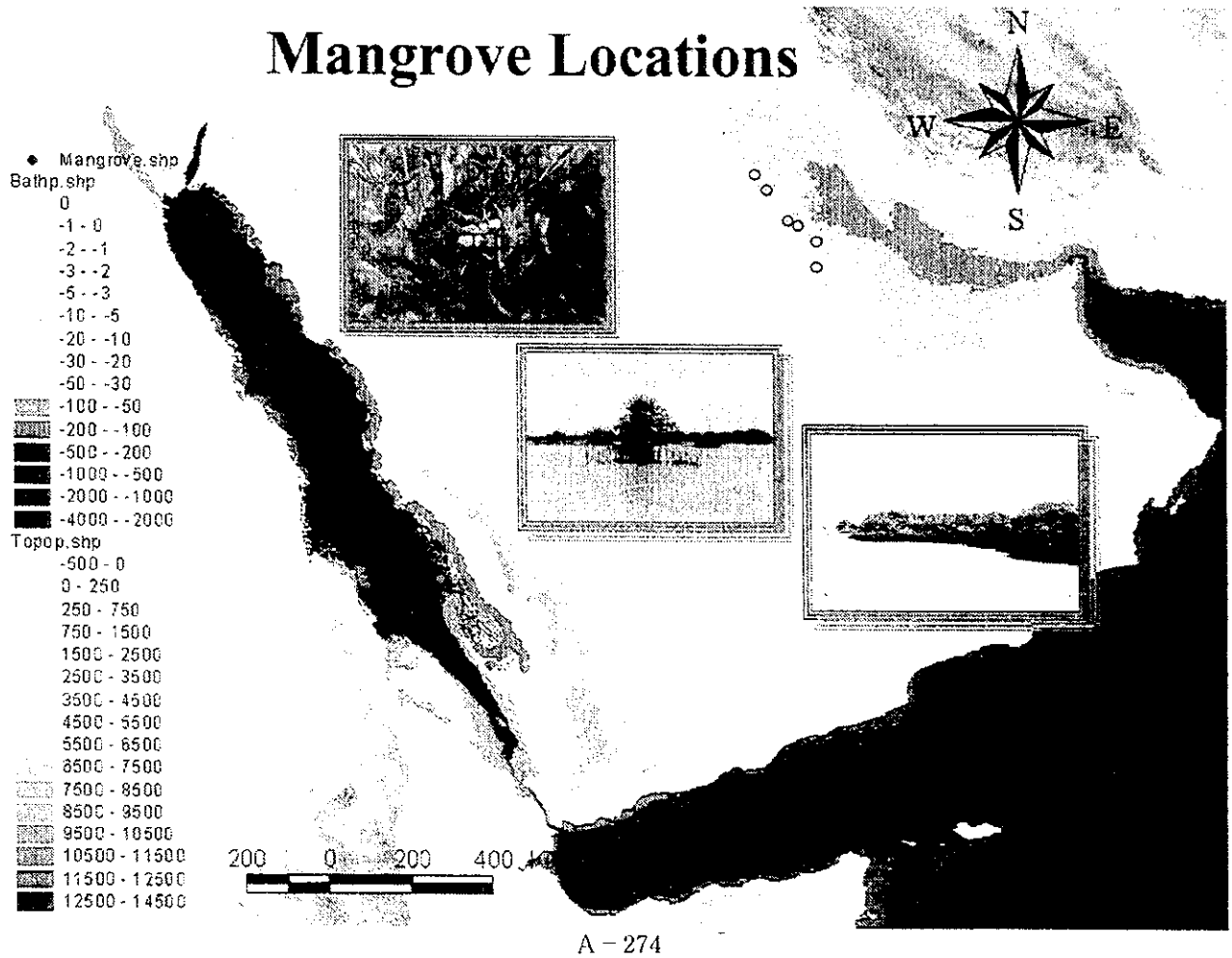

Bathmetry Map
N
W
E
S
Bathp.shp
-4000 - -2000
-2000 - -1000
-1000 - -500
-500 - -200
-200 - -100
-100 - -50
-50 - -30
-30 - -20
-20 - -10
-10 - -5
-5 - -3
-3 - -2
-2 - -1
-1 - 0
0
300 0 300 600 Kilometers

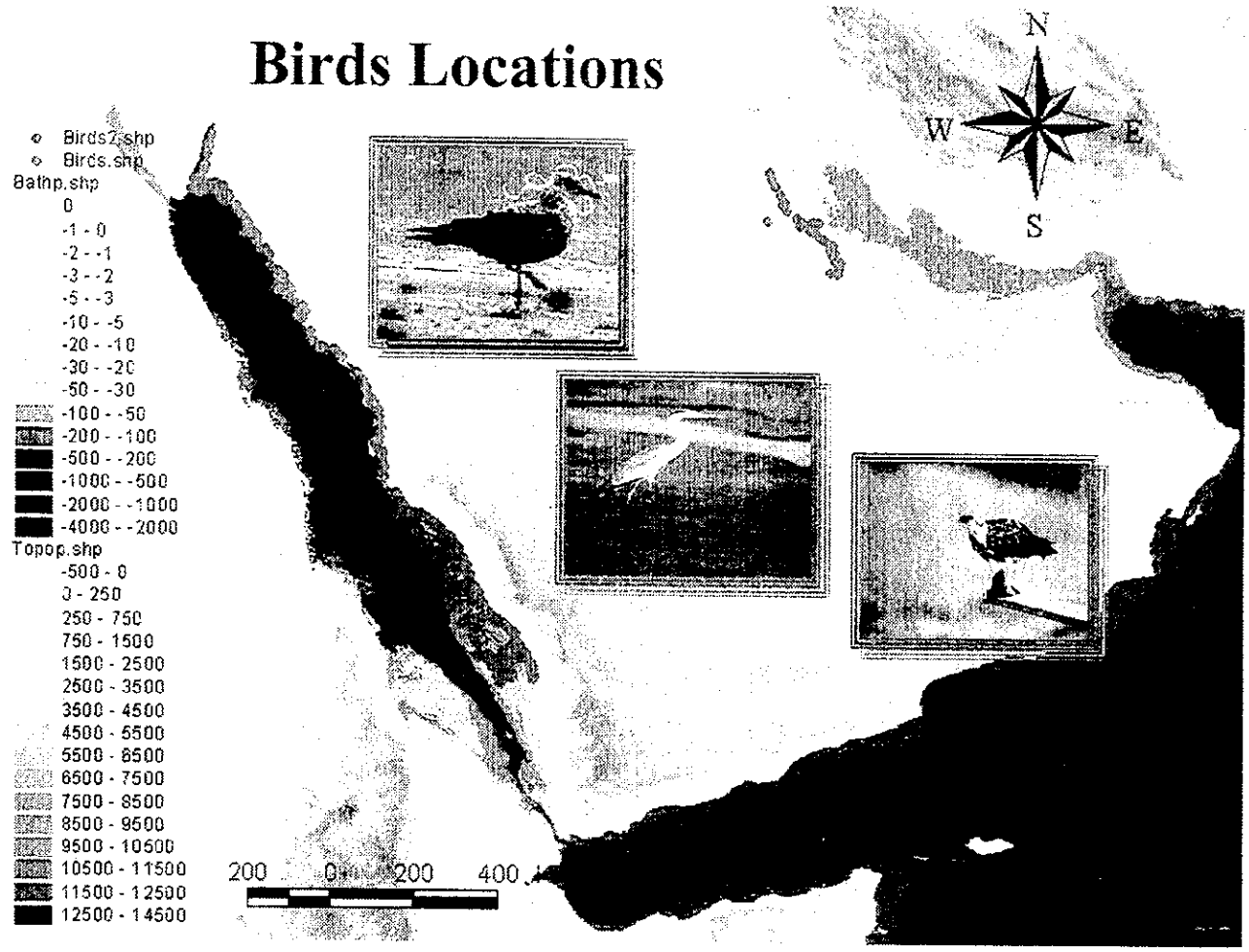

Coastal Zone
N
W
E
S
200 0 200 400 Kilometers

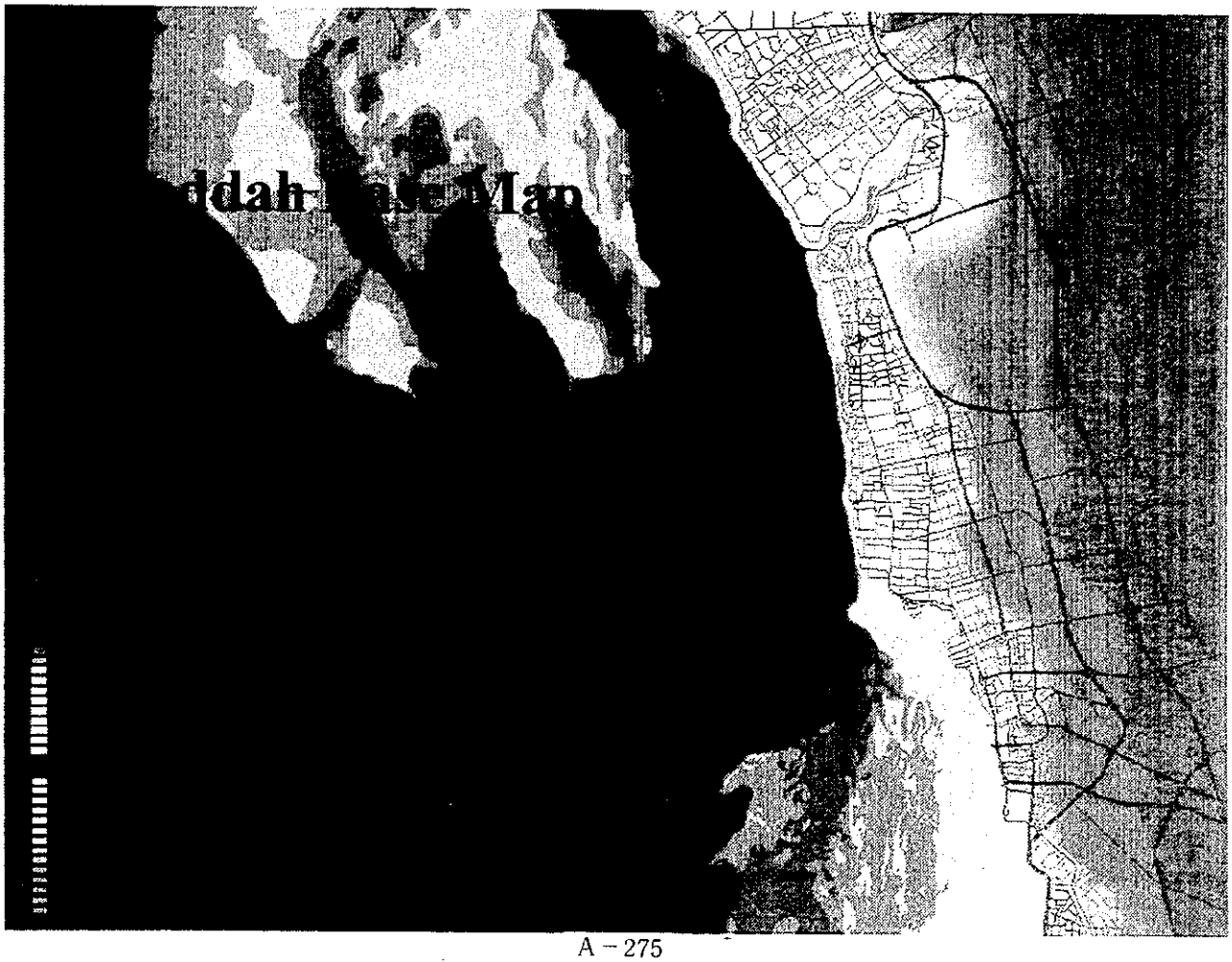
Fish Locations

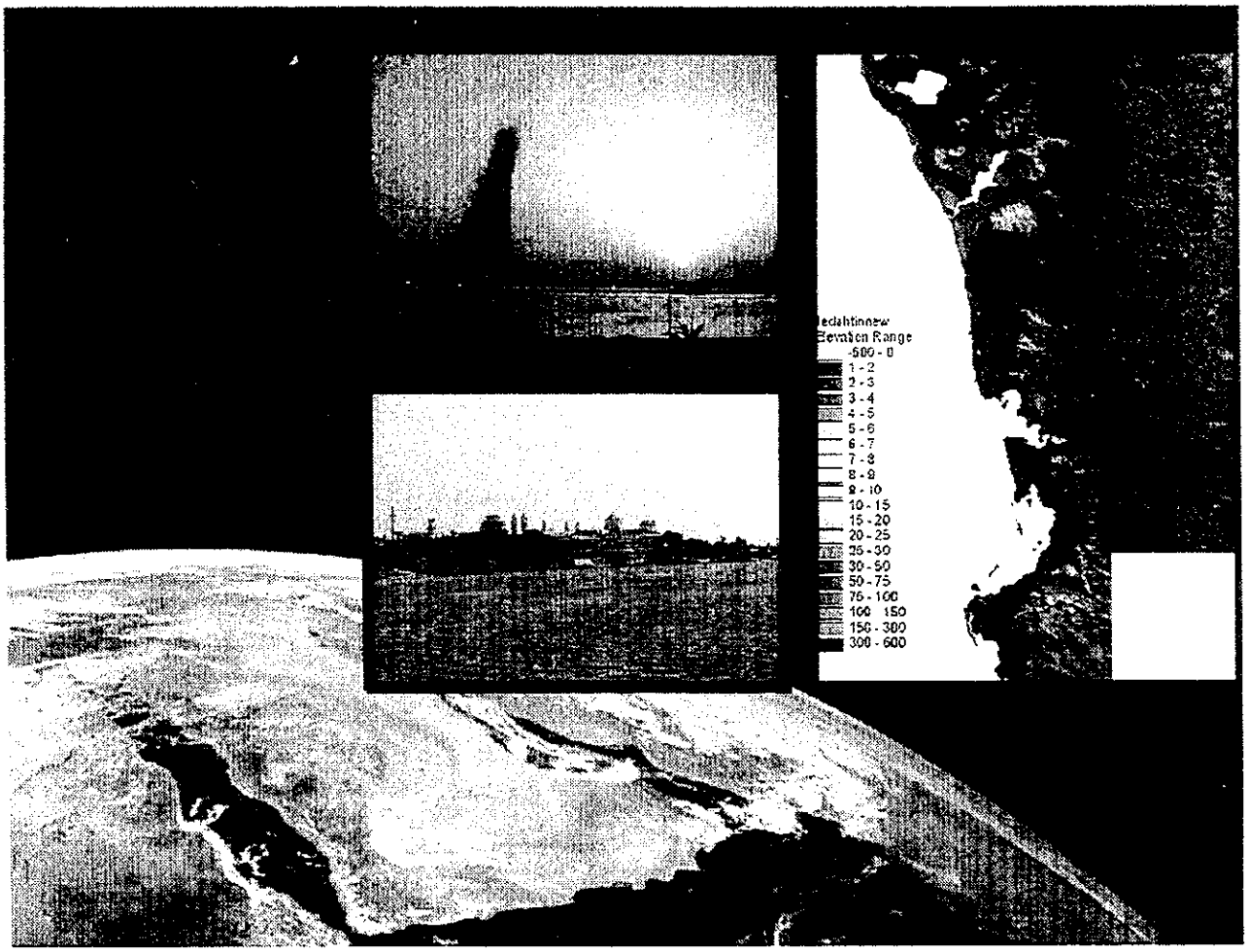


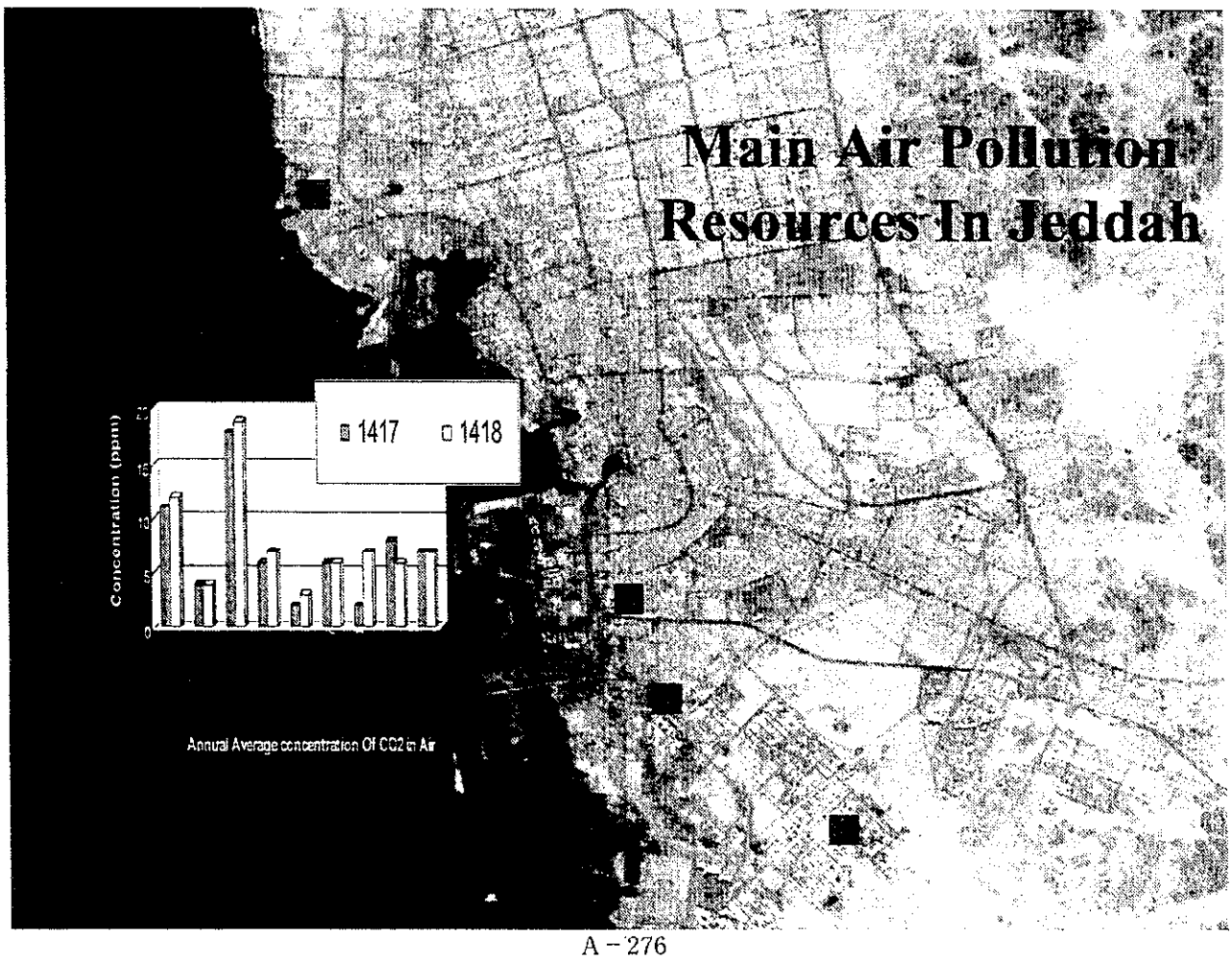
Mangrove Locations

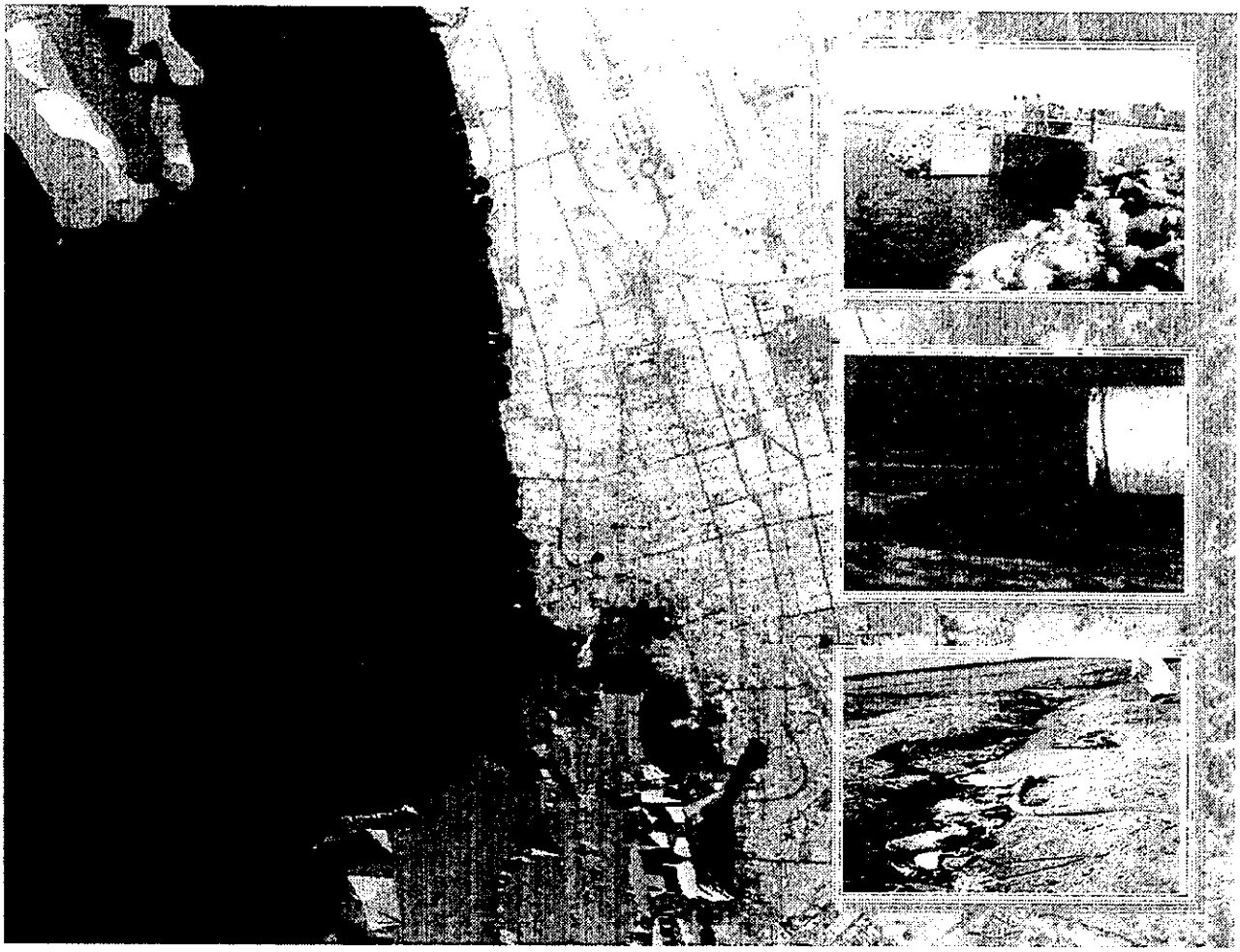



Birds Locations
Birds2.shp
Birds.shp
Bathp.shp
0
-1 - 0
-2 - -1
-3 - -2
-5 - -3
-10 - -5
-20 - -10
-30 - -20
-50 - -30
-100 - -50
-200 - -100
-500 - -200
-1000 - -500
-2000 - -1000
-4000 - -2000
Topop.shp
-500 - 0
0 - 250
250 - 750
750 - 1500
1500 - 2500
2500 - 3500
3500 - 4500
4500 - 5500
5500 - 6500
6500 - 7500
7500 - 8500
8500 - 9500
9500 - 10500
10500 - 11500
11500 - 12500
12500 - 14500
N
W
E
S
200
0
200
400

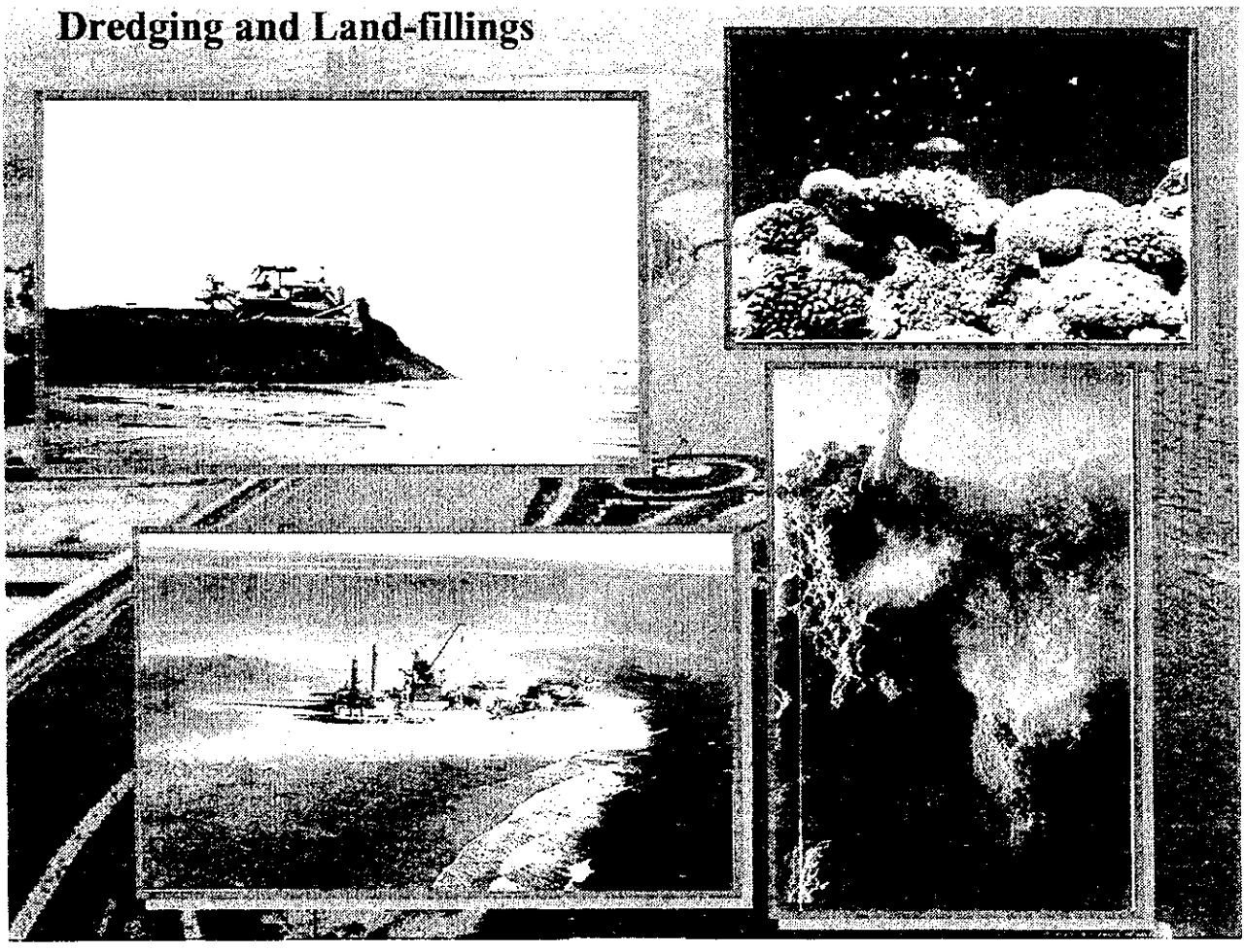


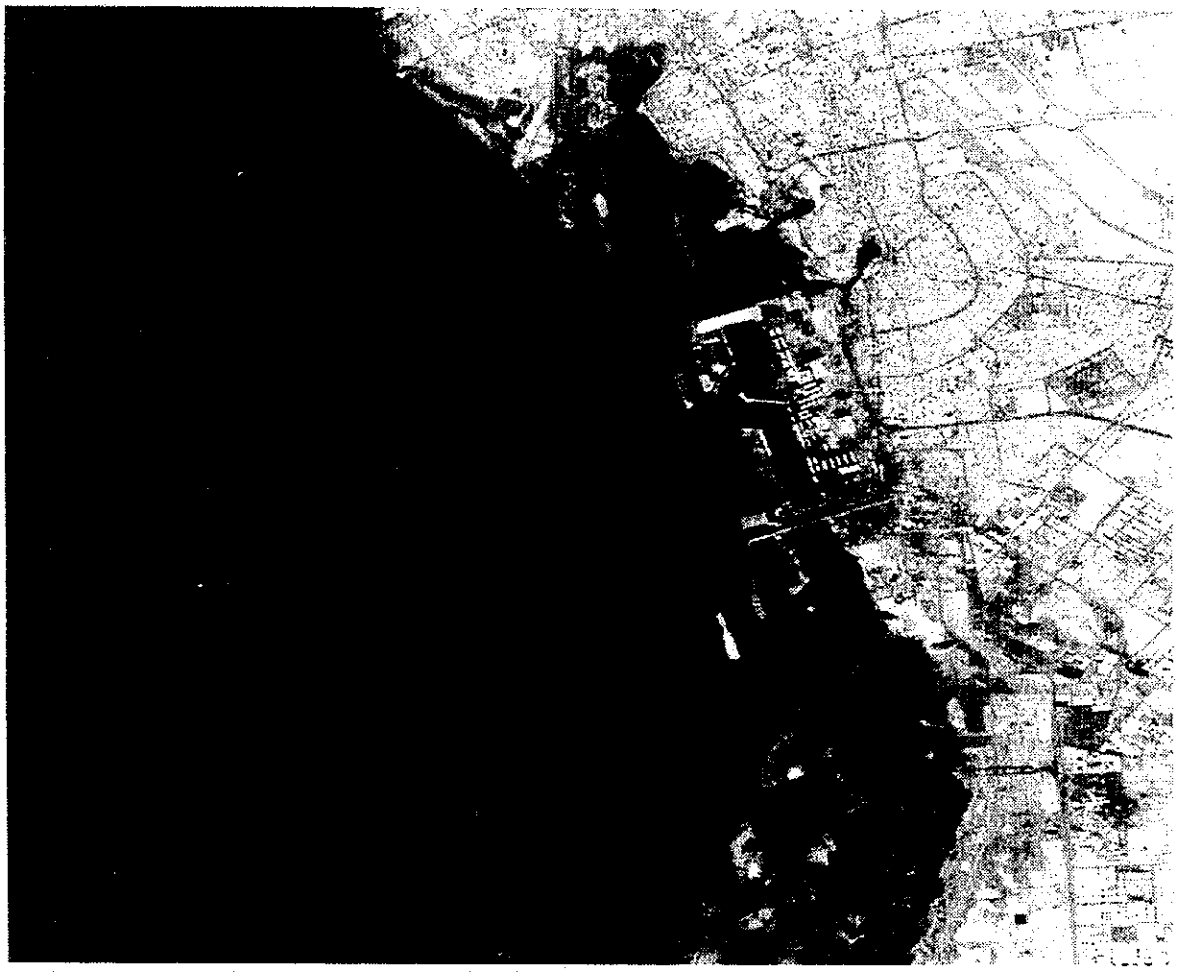

Elevation Range
-500 - 0
1 - 2
2 - 3
3 - 4
4 - 5
5 - 6
6 - 7
7 - 8
8 - 9
9 - 10
10 - 15
15 - 20
20 - 25
25 - 30
30 - 50
50 - 75
75 - 100
100 150
150 - 300
300 - 600


Main Air Pollution Resources In Jeddah
1417
1418
Concentration (ppm)
Annual Average concentration Of CO2 in Air



Dredging and Land-fillings





JICA/MEPA Workshop III

"Seawater Quality Evaluated by Satellite Data Analysis"

Krishna Mishra

Sea Water Quality Evaluation by Satellite Data Analysis

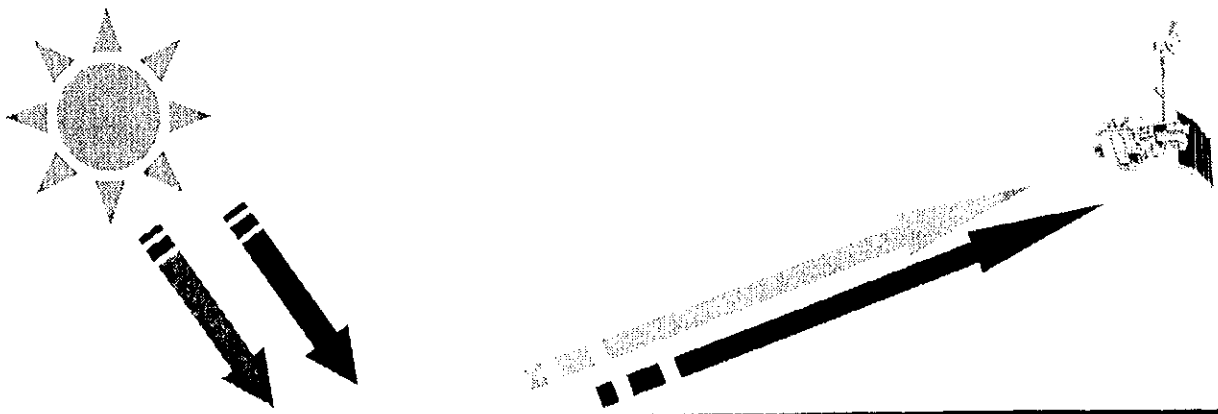
Dr. Krishna Kumar MISHRA

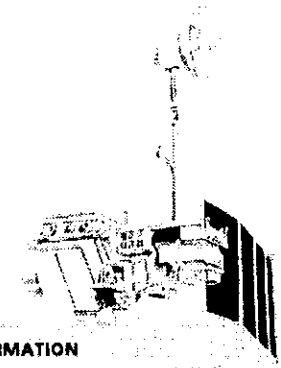
Japan International Cooperation Agency

Member, JICA Team

The marine environment covers 70% of the Earth's surface & is a vital element of the planet's life support system.

Monitoring of Sea Environment is one of the most common applications of the satellites.





TECHNICAL INFORMATION

Spacecraft	–	Landsat 4 (launched 16.07.82)
	–	Landsat 5 (launched 01.03.84)
Orbit	–	Near polar sun-synchronous
	–	98.2° inclination (coverage up to 81° north and south)
	–	Complete orbit every 99 minutes
Altitude	–	705 km, 438 miles
Re-visit	–	16 days
Payload	–	MSS (4 channels)
	–	TM (7 channels)
Spatial Resolution	–	MSS – 80 m
	–	TM – 30 m (except band 6 – 120 m)
Swath	–	185 km x 185 km

The LANDSAT satellite has ability to explore, characterize, monitor, and help protect and manage our earth resources.

LANDSAT TM Sensors

TM Bands	Wavelength (μm)	Resolution (m)	Coverage (km)
1.	0.45 - 0.52 (Blue)	30	185
2.	0.52 - 0.60 (Green)	30	185
3.	0.63 - 0.69 (Red)	30	185
4.	0.76 - 0.90 (NIR)	30	185
5.	1.55 - 1.75 (Int_NIR)	30	185
6.	10.4 - 12.5 (TIR)	120	185
7.	2.08 - 2.35 (MIR)	30	185

Utilized TM Data

	Path/Row	Date	Scene	
1.	165/040-041	Jan 20 1999	Full	3rd Stage
2.	164/041	Dec 12 1998	Full	
3.	164/042	Dec 12 1998	Sub	
4.	163/042	Dec 21 1998	Full	
5.	163/043	Nov 03 1998	Full	

1.	164/041	Oct 12 1999	Full	4th Stage
2,	164/042	Oct 21 1999	Sub	
3.	163/042	Oct 12 1999	Full	

Objectives

Stage 3

Generation of Sea surface Temperature Distribution

Utilization of water quality sampling data for the distributions of

Suspended Solids

Chlorophyll *a*

Coastal Area Distribution

Analysis Procedures

LANDSAT/TM Data searching, selection & acquisition

⇩

Geo-referencing, re-sampling, spectral enhancements, preparation of Mosaic Image

⇩

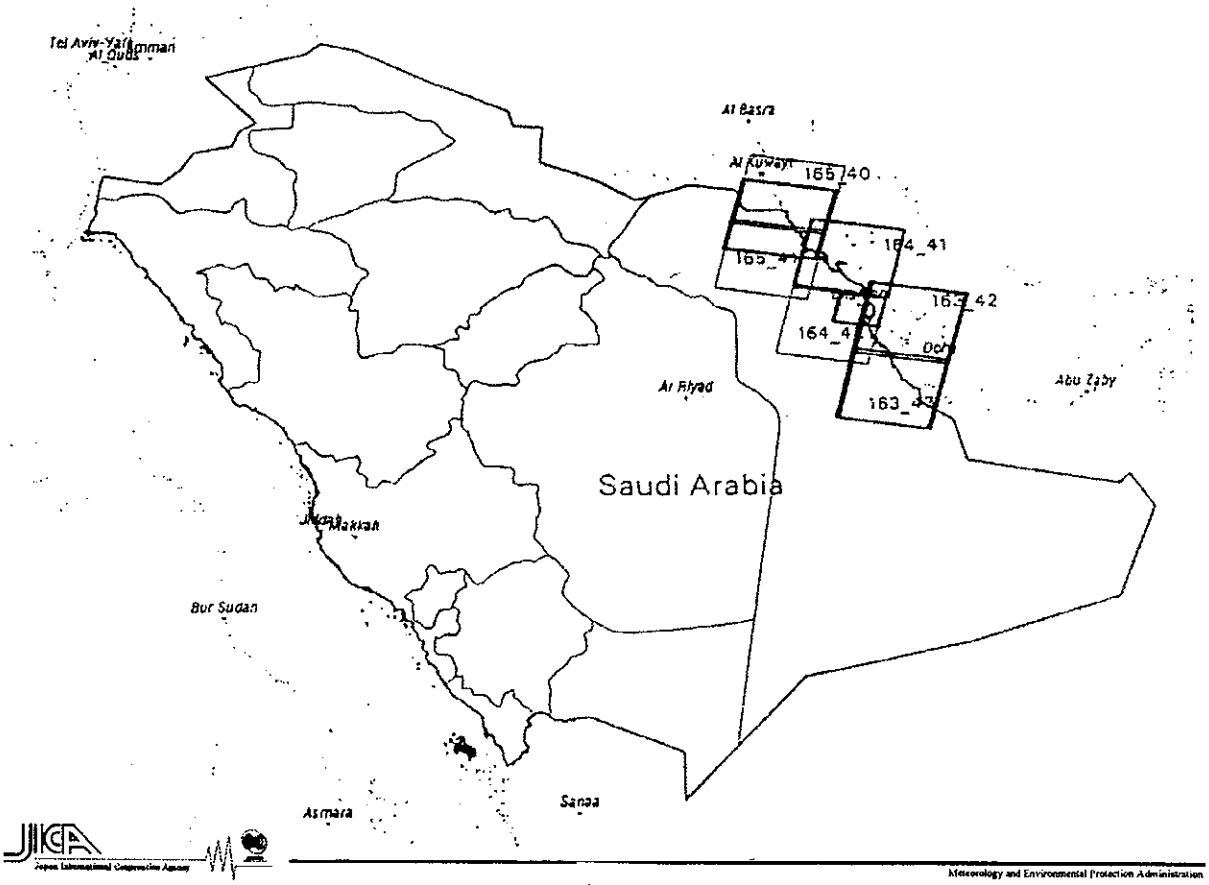
Analysis and distribution map preparation

- Sea surface Temperature Distribution
- Suspended Solids Distribution
- Chlorophyll Distribution
- Coastal Area Distribution

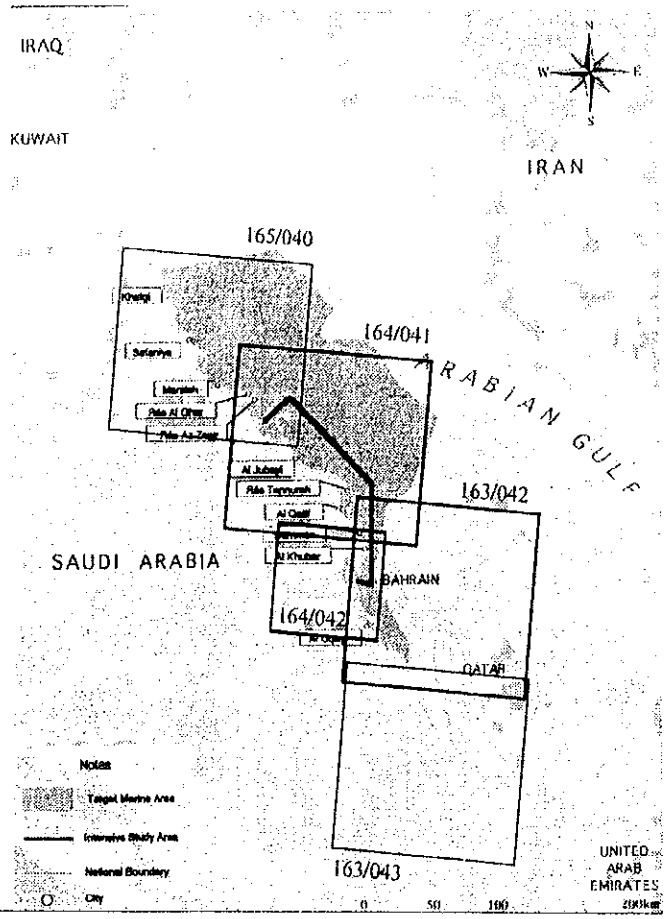
⇩

Reporting

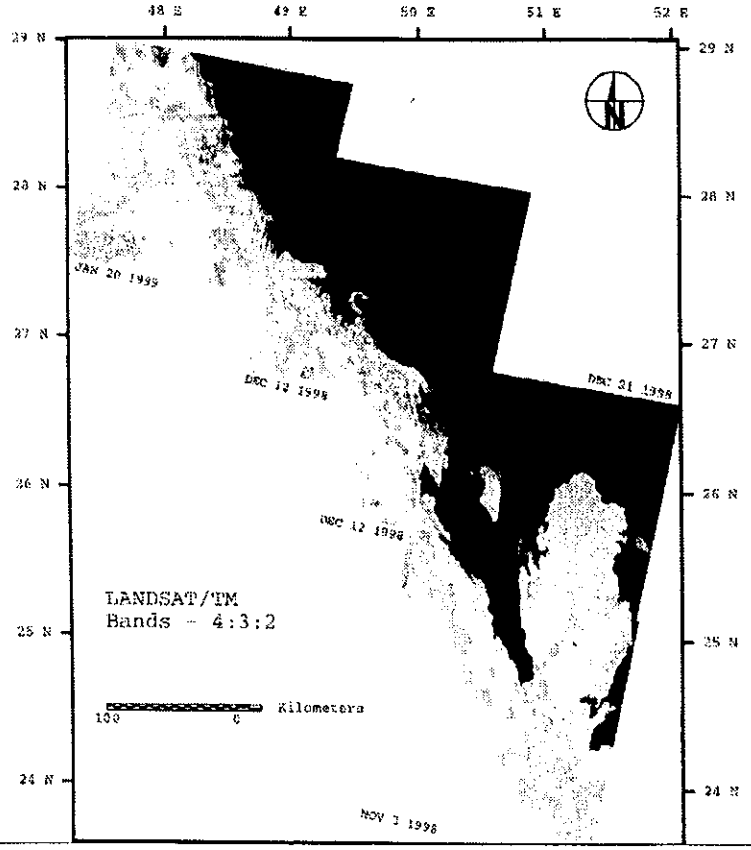
LANDSAT/TM Coverage



TM Coverage of the Target Marine and Intensive Study Area

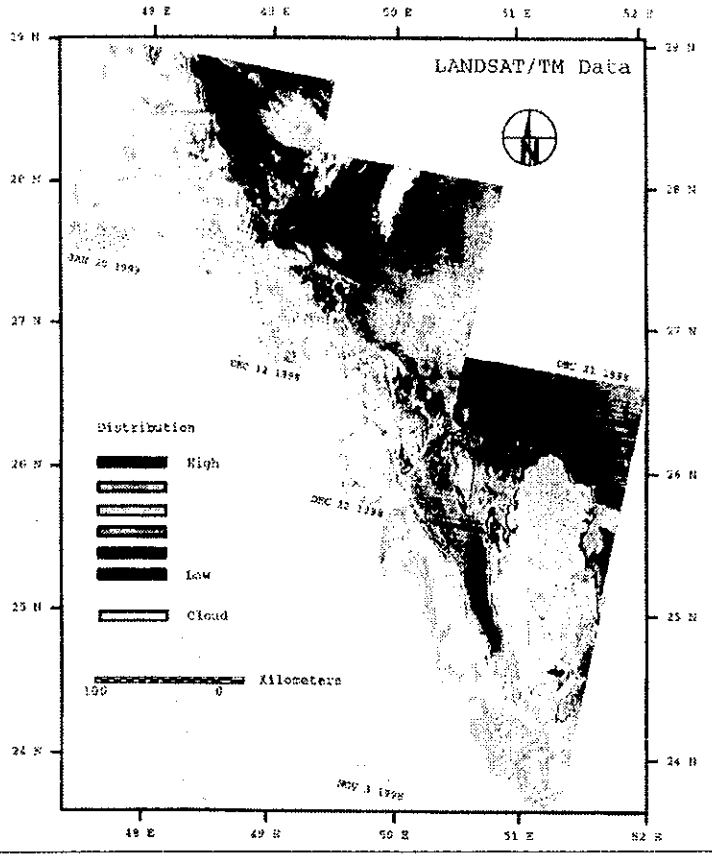


False Color Composite Image – Arabian Gulf, Saudi Arabia



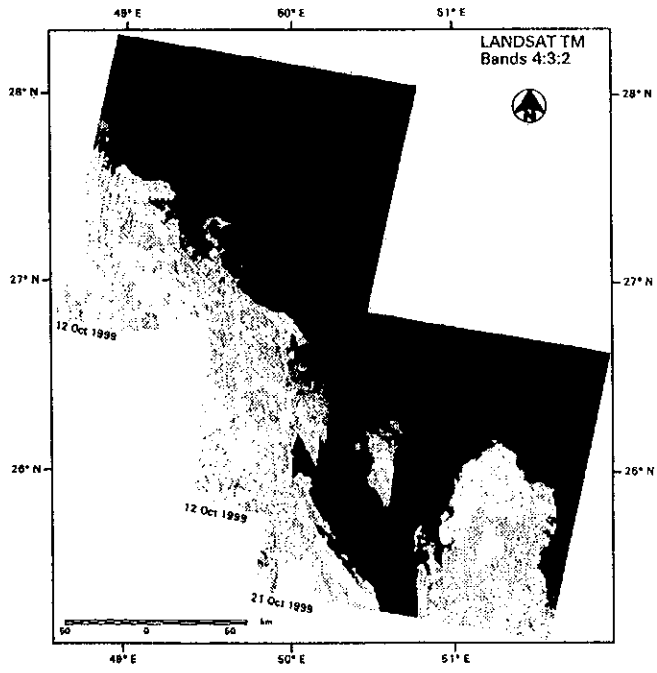
Stage 3

Suspended Solids Distribution – Arabian Gulf, Saudi Arabia



Stage 3

Arabian Gulf, Saudi Arabia



Stage 4

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
METEOROLOGY AND ENVIRONMENTAL PROTECTION ADMINISTRATION (MEPA)