







شبكة المعلومـــات الجامعية التوثيق الالكتروني والميكروفيا.



جامعة عين شمس

التوثيق الالكتروني والميكروفيلم



نقسم بللله العظيم أن المادة التي تم توثيقها وتسجيلها على هذه الأفلام قد اعدت دون آية تغيرات



يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

40-20 في درجة حرارة من 15-20 منوية ورطوبة نسبية من

To be kept away from dust in dry cool place of 15 – 25c and relative humidity 20-40 %









B1.900

MONITORING AND ASSESSING THE WATER QUALITY AFTER THE CONSTRUCTION OF EL-DEKHELA NEW HARBOUR USING REMOTE SENSING TECHNIQUES

Thesis -

Submitted in Partial Fulfillment for the Master Degree of Environmental Studies

By

Maged Shoukry Kamel Guerguess

(B.Sc. in Chemistry)
1989
University of Alexandria

Department of Environmental Studies
Institute of Graduate Studies and Research
University of Alexandria

SUPERVISORS

Prof. Hoda Hassan Baghdadi

Professor of Chemistry,
Head of Department of Environmental Studies,
Institute of Graduate Studies and Research
University of Alexandria

Dr. Wafica Mohamed Aboul Naga

Associate Professor of Marine Chemistry,
Marine Environment Division,
National Institute of Oceanography and Fisheries,
Alexandria.

Ministry of Scientific Research

Dr. Magdy Mohamed Farag

Lecturer of Physical Oceanography and Remote Sensing,

Department of Environmental Studies, Institute of Graduate Studies and Research, University of Alexandria

Dr. Elsayed Ahmed Shalaby

Lecturer of Soil and Water Chemistry,
Department of Environmental Studies,
Institute of Graduate Studies and Research,
University of Alexandria

DEDICATION

TO THE SOUL of MY FATHER
MY MOTHER, Mary
MY SISTER, Terez
MY FIANCEE, Nivirt

I dedicate my work to them.

MONITORING AND ASSESSING THE WATER QUALITY AFTER THE CONSTRUCTION OF EL-DEKHELA NEW HARBOUR USING REMOTE SENSING TECHNIQUES

APPROVED

Hoda Baghdadi 12. Em , v. ip Dr. Horny I brokim Emana

Date / / 1999

Acknowledgment

I am sincerely grateful and thankful to Professor Hoda H. Baghdadi, Professor of Chemistry, head department of environmental studies, Institute of Graduate Studies and Research (IGSR), Alexandria University, for her keen, supervision, time and experience she offered to me through the study and revision of the thesis.

Also, I thank Dr. Wafica M. Aboul Naga, Associate Professor of Marine Chemistry, National Institute of Oceanography and Fisheries, for her active supervision and her assistance during the preparation of the thesis maniscript.

The work reported in the thesis was conducted under the supervision of Dr. Magdy M. Farag, Lecturer of Physical Oceanography and Remote sensing, department of environmental studies Institute of Graduate Studies and Research (IGSR), Alexandria University, who suggested the main idea of this work, helped me to understand and buildup the water parameter models and supervising the satellite image processing. His active supervision, continuous guidance and unlimited encouragement are greatly appreciated.

Also, I wish to express my sincere gratitude to Dr. Elsayed A. Shalaby, Lecturer of Soil and Water Chemistry, department of environmental studies, Institute of Graduate Studies and Research (IGSR), Alexandria University, for giving me the chance to work in his laboratory, continuous encouragement and active supervision. His help in writing the thesis was indispensable.

Special acknowledgment to Professor M. El Raey, Professor of Environmental Physics and Dean of Institute of Graduate Studies and Research (IGSR), Alexandria University, for giving me the chance to work in Remote Sensing Laboratory and for his kind encouragement.

I would like to extend my appreciation to staff members of Remote Sensing Laboratory, Institute of Graduate Studies and Research (IGSR), Alexandria University, for their continuous interest and help.

Finally, I express my thanks to every body who helped me, specially the staff of Marine Chemistry Laboratory, National Institute of Oceanography and Fisheries, Alexandria.

Contents

	Page
CHAPTER I:	
Introduction	
I.1. Introduction	 1
1.2. Study Area	3
I.3. Pollution Problems of Study Area	 7
1.3.1. The main sources of petroleum pollution	8
1.3.2. The main sources of non-petroleum pollution	 9
I.4. Overview of This Study	10
I.5. Aim of the Work	11
I.6. Literature Review	12
I.6.1. Water quality	12
I.6.2. Water quality using remote sensing	14
CHAPTER II:	
Remote Sensing of Marine Environment	
II.1. Introduction	19
II.2. Physical Concepts of Remote Sensing	20
II.2.1. Source of electromagnetic radiation	20
II.2.2. Interaction with earth's surface	20
II.2.3. Interaction with the atmosphere	22

II.2.4. Sensor	22
II.2.5. Image	23
II.3. Application of Remote Sensing in Marine Environment	-23
II.4. Oceanographic Satellite	24
II.4.1. Nimbus- 7	24
II.4.2. NOAA satellite	24
II.4.3. Landsat	24
II.4.4. SPOT	25
II.5. Multi-Spectral Scanner (MSS)	28
II.6. Image Processing Techniques	28
II.6.1. Image analysis	29
II.6.2. Image transformation	31
II.7. Water Quality Algorithms	32
II.8. Application of Water Quality Algorithms	33
II.8.1. Chlorophyll-a algorithms	33
II.8.2. Total suspended matter algorithms	36
II.8.3. Transparency algorithms	38
II.8.4. Salinity algorithms	40
CHAPTER III:	
Materials and Methods	
III.1 Data Acquisition	41

III.1.1. Ground measurements	41
III.1.2. Remotely sensed data	55
III.2. Equipment	58
III.3 Image Processing Techniques	59
III.3.1. Image registration	59
III.3.2. Land masking	60
III.3.3. Spatial enhancement	60
III.4. Application of Water Quality Algorithms	61
III.4.1. Chlorophyll-a algorithm	61
III.4.2. Total suspended matter algorithm	61
III.4.3. Transparency algorithm	62
III.4.4. Salinity algorithm	62
CHAPTER IV:	
Results and Discussion	
IV.1. Introduction	64
IV.2. Digital Interpolated Image	64
IV.2.1. Chlorophyll-a distribution	64
IV.2.2. Total suspended matter distribution	- 69
IV.2.3. Transparency distribution	72
IV.2.4. Salinity distribution	80
IV.3 Visual Interoperation	84

·

.

	,
IV.3.1. Chlorophyll-a distribution	84
IV.3.2. Total suspended matter distribution	89
IV.3.3. Transparency distribution	94
IV.3.4. Salinity distribution	98
IV.4. Statistical Analysis	102
IV.4.1. Chlorophyll-a distribution	·103
IV.4.2. Total suspended matter distribution	108
IV.4.3. Transparency distribution	113
IV.4.4. Salinity distribution	119
IV. Conclusion and Recommendations	124
Summary	126
References	136
Arabic Summary	

•