



شبكة المعلومات الجامعية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ





شبكة المعلومات الجامعية



# شبكة المعلومات الجامعية

## التوثيق الالكتروني والميكرو فيلم

# جامعة عين شمس

التوثيق الالكتروني والميكرو فيلم

## قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
علي هذه الأفلام قد اعدت دون أية تغيرات



## يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

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



شبكة المعلومات الجامعية



# بعض الوثائق الأصلية تالفة



شبكة المعلومات الجامعية



بالرسالة صفحات  
لم ترد بالأصل

**AIN SHAMS UNIVERSITY**  
**FACULTY OF ENGINEERING**  
**IRRIGATION AND HYDRAULICS DEPARTMENT**

**DESIGN OF MONITORING NETWORKS FOR WATER QUALITY**  
**MANAGEMENT IN THE RIVER NILE**

**BY**

**AMAL MOHAMED HASSAN EL SHERBINI**  
**(MS.C Civil Engineering-Southampton University)**

**A Thesis**

**Submitted for Fulfillment of the Requirements for the**  
**DEGREE OF DOCTOR OF PHILOSOPHY**  
**IN CIVIL ENGINEERING**

**Supervised By**

**Prof. Dr. Abd El Fattah E. El Fiky**  
*Chairman of Irrigation & Hydraulics  
Dept., Faculty of Engineering,  
Ain Shams University.*

**Prof. Dr. M. El Moattassem M. El Kotb**  
*Vice President of National Water  
Research Center & Director of Nile  
Research Institute.*

**Prof. Dr. Shaden T. Abd El Gawad**  
*Director of Environment and Climate  
Changes Research Institute,  
National Water Research Center,  
Delta Barrage.*

**Dr. Mohamed M. Nour El Din**  
*Associate Professor,  
Irrigation & Hydraulics Dept.,  
Faculty of Engineering,  
Ain Shams University.*

**Cairo, Egypt**

**1996**

B  
9552



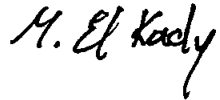
**DESIGN OF MONITORING NETWORKS FOR WATER QUALITY  
MANAGEMENT IN THE RIVER NILE**

**Ph.D. Degree Submitted by  
Eng. Amal Mohamed Hassan El Sherbini**

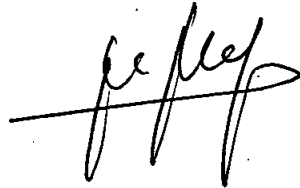
**EXAMINERS**

**Signature**

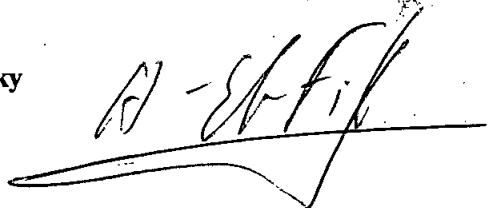
**Prof. Dr. Mona Mostafa El Kady**  
Vice President of National Water  
Research Center.



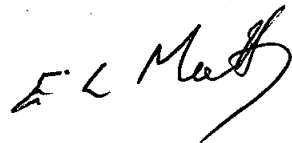
**Prof. Dr. Abd El Mohsen E. El Mongy**  
Prof. of Harbors and Inland Navigation  
Faculty of Engineering, Ain Shams University



**Prof. Dr. Abd El Fattah El Buiomy El Fiky**  
Chairman of Irrigation & Hydraulics  
Department, Ain Shams University.



**Prof. Dr. Mohamed El Moattassem M. El Koth**  
Vice President of National Water Research  
Center & Director of Nile Research Institute.





1000

## **STATEMENT**

This Thesis is submitted to Ain Shams University, Faculty of Engineering for the degree of Doctor of Philosophy in Civil Engineering.

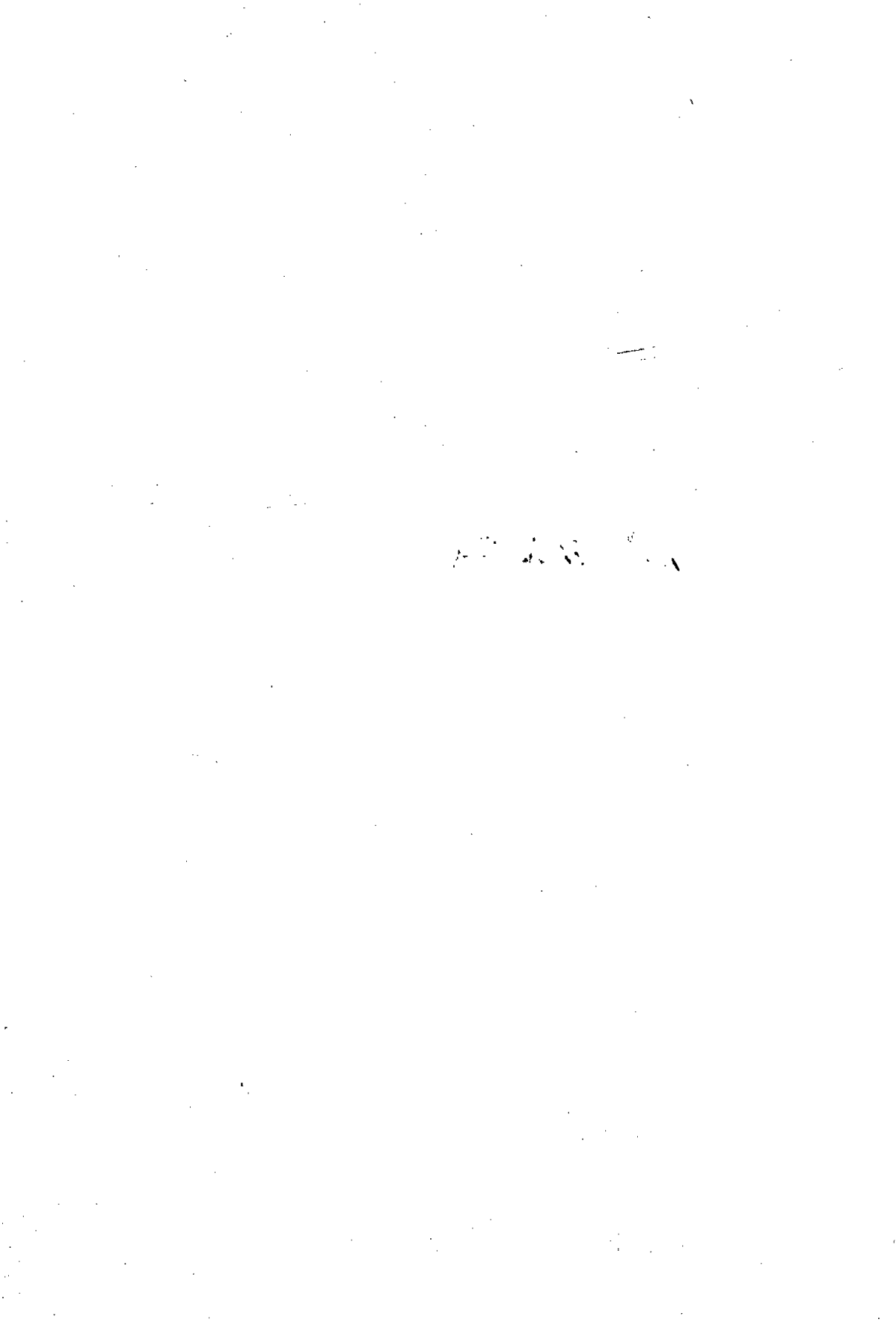
The work included in this thesis was carried out by the author in the Department of Irrigation and Hydraulics, Faculty of Engineering, Ain Shams University, from April 1992 to June 1996.

No part of this thesis has been previously submitted for a degree of a qualification at any other University or Institution.

**Name:** Amal Mohamed Hassan El Sherbini

**Date:**

**Signature:** Amal Elsherbini



## ACKNOWLEDGEMENT

Thanks to GOD for completion of this work. The author would like to express her sincere thanks to ***Prof. Dr. Abd El Fattah El Biuomy El Fiky, Chairman of Hydraulics and Irrigation Department, Faculty of Engineering, Ain Shams University***, for his valuable guidance, excellent suggestions, and advice throughout the preparation of this work. My grateful appreciation to ***Prof. Dr. Mohamed El Moattassem El Kotb, Vice President of National Water Research Center and Director of the Nile Research Institute***, for supervising this work and offering valuable help, encouragement and continuous advice during the preparation of this thesis.

I'm deeply grateful to ***Prof. Dr. Shaden Tawfik Abd El Gawad, Director of Environment and Climate Changes Research Institute***, for her generous help, continuous encouragement, and valuable assistance at the different stages of preparing this work.

The author wishes to express her deep thanks to ***Dr. Mohamed Mohamed Nour El Din, Associate Professor, Irrigation and Hydraulic Department, Faculty of Engineering, Ain Shams University***, for his continuous guidance, valuable instructions, and encouragement which provided great aid for the accomplishment of this work.

The author express her appreciation to ***Mr. Mamdouh Sharara, Environmental Statistician, Computer Science Center, University of Maryland, USA***, for his great help, guidance and advice in performing the procedures in this thesis.

The author would like to express her deep thanks to ***Dr. Magdy Salah El Deen, Researcher, Channel Maintenance Research Institute, Dr. Medhat Aziz, Researcher, Nile Research Institute, and Dr. Wael Soliman, Researcher, Environment and Climate Changes Research Institute***, for their great help during the preparation of this thesis.

Special gratitude is attributed to my ***husband Mahmoud***, for his continuous encouragement and endless support which provided great aid for the accomplishment of this work.



## **ABSTRACT**

**Title:** Design of Monitoring Networks for Water Quality Management in the River Nile.

**Name:** Amal Mohamed Hassan El Sherbini

The objective of this thesis is directed towards designing monitoring networks for water quality management in the River Nile.

Four levels of monitoring networks for water quality are presented in this thesis based on a sound scientific analysis of historical data to obtain as much data and information as needed. These levels are:

- \* Monthly sampling frequency for the primary network which includes 54 stations (basic and impact) and all point sources of pollution for baseline information;
- \* Biweekly sampling frequency for the second network which includes 26 basic stations and heavily polluted point sources for detecting trends;
- \* As required by inspection for law enforcement for the third network which includes 39 impact stations and inspected point sources; and
- \* Daily sampling frequency at Abu Simble sampling station (reference station) for early warning.

A group of specific parameters should be measured in each level of water quality monitoring networks.

In addition to that, 13 sampling stations are selected for monitoring the quality of the bottom and suspended sediments. These stations are chosen at the same locations of the designated water quality stations. Basic stations are used for baseline data and future comparisons. Impact stations are used to detect the impact and spatial distribution of contaminants from point sources of pollution inputs.

Sediment samples should be monthly collected in the period between May to October and bimonthly in the period between November to April. Another set of samples which is core samples of 20 cm are to be taken at the 13 sampling stations every 5 years for detecting contaminants accumulation. A group of specific substances are measured according to the monitoring objectives.

**Key Words:**

Water quality, management, monitoring, network design, data analysis.

