

بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ



شبكة المعلومات الجامعية
التوثيق الالكتروني والميكروفيلم



شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

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WATER QUALITY CONTROL IN OPEN DRAINS AND ITS EFFECT ON SOIL PROPERTIES

BY

ADEL ABDEL RASHEED SOLIMAN MOHAMED
B.Sc. Agr. (Soil Science), Ain Shames University, 1976
M.Sc. Agr. (Soil Science), Ain Shames University, 1996

A thesis submitted in partial fulfillment
of
the requirement for the degree of
DOCTOR OF PHILOSOPHY

in

Agricultural Science
(Soil Science)

Department of Soils
Faculty of Agriculture
Ain Shams University
2002

711
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APPROVAL SHEET

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B.Sc. Agr. (Soil Science), Ain Shams University, 1976

M.Sc. Agr. (Soil Science), Ain Shams University, 1996

This thesis for Ph.D. degree has been approved by:

Prof. Dr. Ibrahim Mohamed Habib

Prof. of Land Rec., Fac. of Agr., Cairo Univ.

Prof. Dr. El-Hasnaa Abou-Gabal Mohamed

Prof. of Soil Physics, Fac. of Agr., Ain Shams Univ.

Prof. Dr. Moneer Abdo Aziz

Prof. of Soil Physics, Fac. of Agr., Ain Shams Univ.

Prof. Dr. El-Tony Mohamed Ali

Prof. of Soil Physics, Fac. of Agr., Ain Shams Univ.

Date of Examination / / 2002

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ADEL ABDEL RASHEED SOLIMAN MOHAMMED

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M.Sc. Agr. (Soil Science), Ain Shams University, 1996

Under the supervision of:

Prof. Dr. Moneer Abdo Aziz

Prof. of Soil Physics, Fac. of Agr., Ain Shams Univ.

Prof. Dr. El-Tony Mohamed Ali

Prof. of Soil Physics, Fac. of Agr., Ain Shams Univ.

Prof. Dr. Shaden Twfik Abdel Gawad

Prof. of Civil Eng, Director of Drainage Research Institute

Abstract

Adel Abdel Rasheed Soliman Mohamed. Water quality control in open drains and its effect on soil properties. Unpublished Doctor of Philosophy Dissertation, Ain Shams University, Fac. of Agric., Department of soil science, 2002.

The present work was conducted to develop a system to formulate alternative strategies to improve the water quality in Gharbia main drain system to allow its safe usage in irrigation and for livestock watering. Therefore, a pollution sources have been surveyed covering the all Gharbia drain catchments (450 thousand faddan) and a monitoring program has been carried out during two years, 1997 and 1998 covering whole Gharbia mainstream system.

The obtained results showed that the Water quality of Gharbia main drain is suitable for irrigation purpose from the view points of salinity, SAR, and heavy metals concentrations. This water has no effect on the pH value along the drain, where the average pH values were ranged from 7.43 to 7.72 for all soil depths along Gharbia main drain

The average daily decay rates of faecal coliform (FC), biochemical oxygen demand (BOD₅), chemical oxygen demand (COD), total nitrogen (TN), total phosphorus (TP) and total suspended solids (TSS) were 0.55, 0.25, 0.14, 0.08, 0.25 and 0.32, respectively. The FC was relatively higher than the others. The decay rates of BOD, FC, and TN exhibited a proportional increase with the temperature while the decay rates of TP and TSS fluctuated without correlation. Moreover, no significant influences of toxicity from industrial wastes or salinity from drainage water on the biological process were detected.

Calibrated water quality variables [water level (WL), discharge (Q), faecal coliform (FC), chemical oxygen demand (COD), biochemical oxygen demand (BOD), dissolved oxygen (DO), total nitrogen (TN), total suspended solids (TSS) and total phosphorus (TP)] simulated with

DUFLOW model along Gharbia main drain indicated that the all-previous calibration variables were comply with the calibration criteria.

A number of possible water quality improvement interventions were simulated through several scenarios using unsteady one-dimensional hydrodynamic model, DUFLOW. A water quality module has been developed to fit with the drainage system circumstances and compiled to DUFLOW. Also, wetlands model have developed using Visual basic language to simulate the fifth scenario.

There is one option to meet the microbiological quality criteria for irrigation use. This option is constructing wetlands (biological treatment) at areas where the drainage water are mixing with irrigation canal (reuse of drainage water).

Many factors were affected the value of soil hydraulic conductivity along Gharbia main drain such as soil salinity, soil texture, soil structure, depth of water table and its salinity, and the distance from the sea, which affected the salinities of both soil and water table. The obtained data of soil hydraulic conductivity at each location were the result of the interaction between these factors.

The difference in mean weight diameter (ΔMWD) in the studied soil profiles at different locations were ranged between 4.45 – 5.15 at the first four locations from the sea, while the lowest value of ΔMWD (3.5) was obtained at the last locations from the sea (68 km). The soils at the last location (68 km from the sea) was more stable than the other ones. At the same time these results confirmed with the values obtained for the aggregate state, degree and index.

Keywords:

Gharbia main drain, Water management, Pollutant decay rates, water quality modeling, Wetlands, Biological treatment, Soil chemical properties, and Soil physical properties.

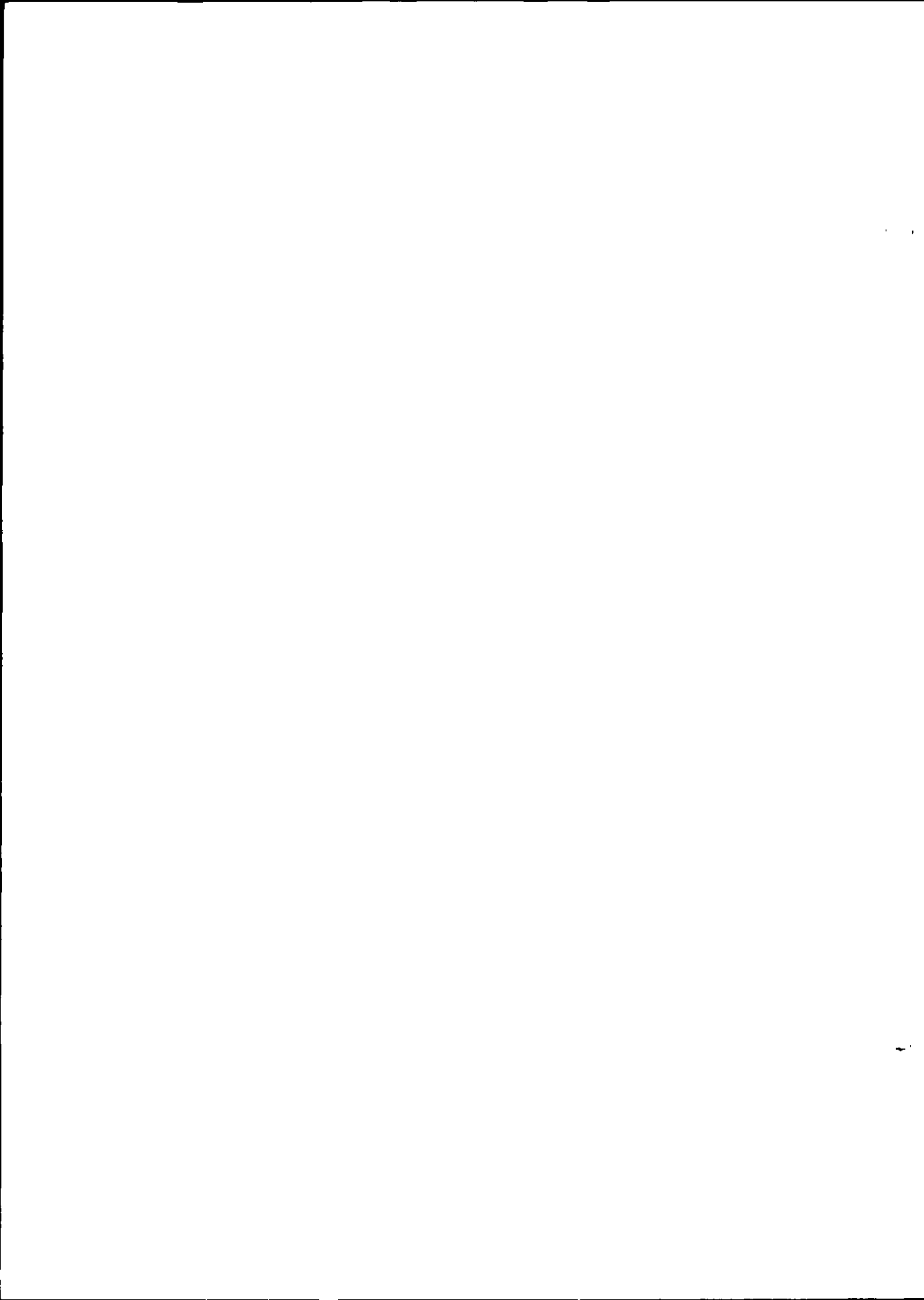
ACKNOWLEDGEMENT

The author wishes to express his deepest appreciation and gratitude to Dr. **Moneer Abdo Aziz** and Dr. **El Tony Mohamed Ali**, Professors of soil physics, Soil Department, Fac. of Agri., Ain Shams Univ. and Prof. Dr. **Shaden Tawfic Abdel Gawad**, Director of Drainage Research Institute (DRI), National Water Research Center, Ministry of Water Resources and Irrigation, for their supervision, valuable advice, patient, scientific and technical remarks, kind encouragement and valuable assistance through this work.

Grateful thanks are also due to Dr. Ashraf El Sayed, head of Open Drainage Department (DRI), Prof. Dr. Mohamed Abdel Khalik, Deputy Director (DRI) and Dr. Gamal Abdel Nasser (DRI) for their valuable helps and gratitude assistances.

I would like to express my appreciation to the DRI staff for their encouragement and support.

Sincere thanks are also extended to my wife and family for their kind encouragements, which made this work possible.



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