INCREASING THE EFFICIENCY OF EL-SALAM CANAL PROJECT BY USING DIFFERENT WATER QUALITY MODELS

Submitted By

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B.Sc. Sciences (Physics), Faculty of Women, Ain Shams University, 1995

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A Thesis Submitted in Partial Fulfillment

Of

The Requirements for the Doctor of Philosophy Degree

In

Environmental Science

Department of Environmental Basic Sciences

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Abstract

Egypt suffers from rapid population and urbanization which puts increasing stress on its limited water resources. This is directly seen in terms of increasing the efforts required for ensuring food security for the Egyptian public.

As an example of these efforts, the Egyptian Government started El-Salam Canal Project (**ESCP**) for the reclamation of an estimated 620,000 feddans of desert situated extended to Mediterranean coast of Sinai. The main sources of the project water are the Damietta Branch of the River Nile and the agricultural drains; Lower Serw, Farsqur and Bahr Hadus.

Therefore, the water quality of these sources are monitored regularly to check its compliance with the national quality standards. However, recent debates were raising questions about the status of the project water quality (now and in the future) especially with the increasing pollution risks.

Therefore, the main objective of this study is to review the terms of reference associated with ESCP and develop numerical/data driven models to simulate the project working conditions using real field data. Then, the study proposed alternative working scenarios that are acceptable from the environmental perspective.

The analysis started by developing three models for water quality data collected monthly during the period from 2003 to 2015. They include; **Model I** simulates the canal reach from its intake at Damietta Branch until the point just before the outfall of Lower

Serw drain, **Model II** simulates the canal reach from its intake from Damietta Branch until the point just before the outfall of Hadus drain and **Model III** simulates the canal reach from its intake from Damietta Branch until the point just before the Suez Canal Syphon. These models were then used to forecast the water quality of project water under different working scenarios.

The developed models are working well in predicting different quality parameters of water (i.e. TDS, BOD, COD, DO and Fe).

Two water management scenarios are presented for the future operation of the project. They include; **Scenario A** which investigated the case of increasing the water quality variables for each water source by 15%, 25%, 50%, 75% and 85%, respectively from its mean (2003 - 2013) and **Scenario B** which investigated the case of decreasing the water quality variables for each water source by 15%, 25%, 50%, 75% and 85%, respectively from the mean (2003 - 2013).

The results indicate that in months of high demand, it is possible to increase the discharges to ESCP from Farsqur drain up to 75%(189.27m.m^3/month) or increasing from Lower Serw or Hadus drains up to 85% (508.5 , 381.8 m.m^3/month) respectively (if needed/available) assuming their current levels of concentrations are maintained. This will not significantly deteriorate the canal water in relation to the water quality parameters: TDS, BOD, DO, Fe and COD.

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