EFFECT OF ENVIRONMENTAL FACTORS ON WATER SOURCES CHRACTERSTICS AT El SADAT CITY - EGYPT

Submitted BY

Nora Abdel Rahman Mohamed Abdel Rahman

B.Sc. of Science (Biochemistry), Faculty of Science,

Ain Shams University, 2010

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A Thesis Submitted in Partial Fulfillment

Of

The Requirement for the Master Degree

In

Environmental Science

Department of Environmental Basic Science.

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APPROVAL SHEET

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ABSTRACT

Student Name: Nora Abdel Rahman Mohamed Abdel Rahman

Thesis Title: Effect of environmental factors on water sources characteristics at El Sadat City- Egypt.

Degree: M.Sc.: (Environmental Science)

The present work aimed at studying the chemical characteristics of both surface water and groundwater systems at El Sadat City and detecting the pollutants in them in addition to discuss their effects on the human health beside the evaluation of these water resources for the different purposes. El Sadat City is located in the north-west of Cairo at the point of 93km on the Cairo – Alexandria desert road with a total area 500km^2 and is bounded by latitudes 30^0 18' & 30^0 30'N and longitudes 30^0 30' & 30^0 50' E. To achieve the target of this work, forty-five water samples were collected from the study area representing El-Rayyah El–Nasery (2 samples), the oxidation ponds (2 samples) and (41 samples) from the aquifers groundwater. The collected samples were analyzed chemically for detection the major and minor components as well as trace constituents in the water resources. In addition to, the organic and bacteriological pollutants at the study area were determined.

The obtained results indicate that all surface water samples (El-Rayyah El–Nasery) and the majority of the groundwater samples (93%) at the study area are fresh water, while the rest of the groundwater samples (7%) are brackish water. All surface water and majority of the groundwater samples (90%) are suitable for drinking as they have salinity as

well as nitrite, nitrate, phosphate and trace constituents less than the permissible limits as well as their low contents from faecal coliforms. While, the rest of the groundwater samples (10%) are unsuitable for drinking as they have nitrite, nitrate, phosphate and trace constituents higher than the permissible limits as well as their high contents from faecal coliforms.

However, the oxidation ponds water samples have higher nitrite, nitrate, phosphate and trace constituents more than the permissible limits as well as its high content from faecal coliforms, reflecting high polluted water.

The most pollution sources are the factory's wastewater that presented at El Sadat city and from the excessive seepage of drainage water that rich in fertilizers and pesticides, which causes groundwater pollution.

It worth to mention that, it is very important to desalinate the brackish water (7%) and treat the polluted water samples chemically (24%) and bacteriologically (10%) at the study area before using especially for human, livestock and poultry drinking. Also, the brackish water can be used for irrigation of some types of crops. On the other hand, the oxidation ponds water can be used for irrigation the wood trees at the study area.

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ABBREVIATION

AMSL	Above mean sea level.
BMSL	Below mean sea level.
APHA	American Public Health Association.
EC	Electric conductivity.
FAO	Food Agriculture Organization.
km	Kilometer.
m	Meter.
me/l (epm)	Melli equivalent per liter.
NTAC	National Technical Advisory Committee.
pH	Hydrogen ion activity.
ppm	Part per million.
NRC	National Research Center.
SAR	Sodium Absorption Ratio.
TDS	Total dissolved solids.
DNHW	Department of National Health and Welfare.
WHO	World Health Organization.
Cfu	Colony Forming Unit.
COD	Chemical oxygen demand
BOD	Biological oxygen demand

1- INTRODUCTION

Nowadays there is a worldwide increase for water demands to set up new communities, agricultural and industrial projects due to increase population as well as improving of the standard living, which dictates that water science, and management practices accept great importance.

In other words, the establishment of new settlements and land reclamation projects were done to overcome the overpopulation problems. This policy will lead the people to leave the old Nile valley in order to redistribute the population density throughout the whole area of Egypt. The future developments for the many reclaimed desert areas in Egypt will depend on how the increasing demands for water will be satisfied and to how the economic and environmental costs for that demand may meet.

Since the early eighties, great governmental and private efforts are being paid to develop the western fringes of the Nile Delta region, including El–Sadat city, in the form of new reclaimed lands, agricultural projects and expand industrial activities. All development plans in this area depend mainly on groundwater due to lack of surface water supplies (Ghimire, 1994).

El Sadat city is one of the largest and important cities in Egypt. It has been constructed more than four decades ago at about 93 km of Cairo along the Cairo – Alexandria desert road. The study area is bounded by latitudes 30^0 18' & 30^0 30' N and longitudes 30^0 30' & 30^0 50' E. The total area of El Sadat city is about 500km^2 (Fig.1). It accommodates a population number of 250,000 capita after estimate of 2016. Great and continuous governmental and popular efforts were paid to develop this area in the form of big agricultural and industrial projects.

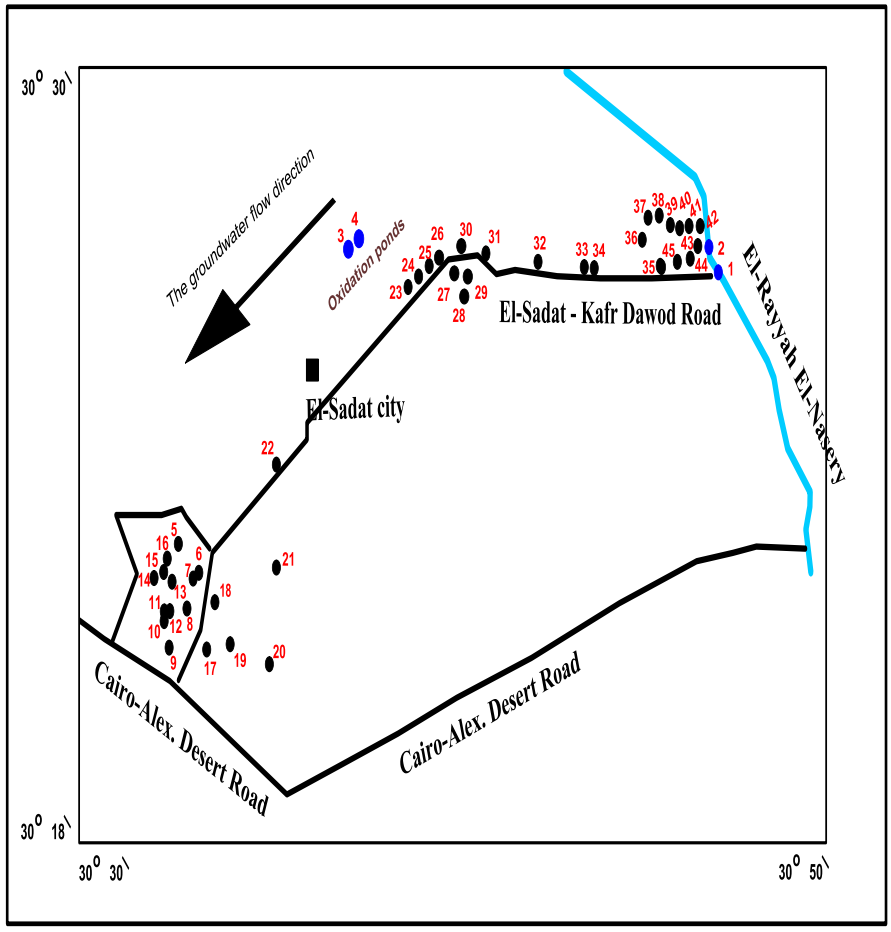

Fig.1. Sampling sites map.

El Sadat city is the largest industrial city in the country, formed in 1978. There are more than 94 factories of chemical and metallurgical industries, textile, plastic and paper production

Approximately, El–Sadat city depends mainly on the groundwater reservoir for the different purposes (drinking, irrigation and industrial purposes). There are two wastewater ponds (oxidation ponds) constructed, northeast of El Sadat city and they used for the collection of domestic and industrial waste via a network of pipelines. From the climatic point of view, the area under investigation belongs to the semi-arid region, where it is characterized by hot and dry weather in summer and mild to cold weather in winter. The mean monthly maximum temperature within the study area ranges between 19.5 and 34.4 ^{0}C with an average of 25.6 ^{0}C, while the mean minimum temperature ranges between 7 and 20 ^{0}C with an average of 12 ^{0} C. The rainfall (mm) and runoff are very scarce.

Great attention paid to its aquifer due to its high potentiality as it mainly recharged from the Nile Delta fresh aquifer. The water resources in the study area divided into surface water and groundwater. The surface water represented by El-Rayyah El–Nasery, which extends from the northeast to the north of the study area. On the other hand, groundwater represented by the Pleistocene aquifer, which is the main groundwater reservoir in El Sadat city and almost all the productive wells of this aquifer yield the water needed for domestic, agricultural and industrial activities. Minor feeding also comes from scarce rainfall and surface infiltration.

***<u>The aim of study</u>*:**