# HYDROGEOLOGY OF THE COASTAL ZONE BETWEEN EL AMERIYA AND EL HAMMAM


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## ABSTRACT

The present work presents an evaluation of groundwater occurrence, movement, quality and regime in the area between El-Ameriya and El-Hammam along the Mediteranean Coastal Zone.

From the geomorphological point of view the different types of land forms and their characteristics and distribution are discussed for the assessment of their impact on groundwater occurrence and quality.

Geological studies were carried out on local water-bearing formations encountered in 35 drill holes. The aquifer geology, distribution and interrelations are evaluated.

In dealing with surface hydrology, detailed climatic conditions and relationships, as well as, the infiltration capacities of the surface deposits are considered. The seepage flux of surface water into the groundwater body is estimated as a source of groundwater gains.

Detailed analysis of a number of pumping test data for various aquifers are carried out for the estimation of hydrologic parameters. The groundwater behaviour and regime in both carbonate and clastic aquifers, for the period 1980-1986 are determined. The water budget for the studied area expressed as water gains, losses and storage are evaluated.

Intensive chemical analyses are carried out for 135 water samples from both surface and ground waters. The chemical characteristics of El-Nahda Canal fresh water and Mallahet Maryut brines, and their possible influence upon groundwater are confirmed. The groundwater chemistry of the carbonate aquifer in the coastal plain and the clastic aquifer in Abu Mina basin and Modern Deltaic Plain is discussed in detail, graphically represented and evaluated.

The geochemical classification of the groundwater in the investigated aquifers is discussed in detail through two main systems of ion behaviour and relationships, namely; the semilogarithmic ion plotting system and the trilinear ion plotting system. Using both systems, four methods of classification are adopted and important results concerning genesis and formation of groundwater mineralization are obtained.

The geochemical evolution of groundwater with distance, time, pumping rates, aquifer materials and mixing processes are given particular attention in the present study. The origin of groundwater mineralization for both aquifers is well defined in a number of representation graphs and geochemical relationships.

Detailed study on the evaluation of different types of groundwater quality for domestic and agricultural purposes is given.

# CONTENTS

Page



CHAPTER III

AQUIFER PROPERTIES AND HYDROLOGIC BALANCE

Page

**Page**

## LIST OF FIGURES

## LIST OF TABLES

# INTRODUCTION

## i) Forward:

The present study area lies within the north-western littoral zone of Egypt, between latitudes 30° 50' - 31° 10' N and longitudes 29° 10' - 29° 50' E (Fig. 1), occupies about 650 km$^2$ and is geographically bounded by the Mediterranean Sea to the North, Alam Shaltut - Alam El-Afrag ridges to the south, El-Agami cape to the east and the elevated tableland at El-Hammam area to the west.

The area under investigation is considered as a natural extension of the north-west Delta region and is characterized by mild topography, semi-arid climatic conditions and is traversed by a net of good roads connecting it with the main cities and towns of the region. Accordingly, this area obtained top priority concerning regional development projects including land reclamation and development, establishment of economic and recreation centres. Land reclamation and development programmes are bas mainly on the utilization of Nile water provided by El-Nahda Canal. However, due to the decline in Nile water resources in the past years it was necessary to look for the local groundwater potentialities as a supplementary source.

Variability of physiographic, geologic, hydrogeologic and hydrologic conditions within the study area is reflected on both surface and groundwater quality. On this basis it is of vital scientific, as well as economic importance, to investigate and study thoroughly the hydrogeologic and hydrologic conditions of the different water-bearing formations within the area of study and their bearing on the hydrogeochemical conditions and surface and groundwater quality. These subjects form the core of the present study.