INTRODUCTION

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1. Justification of the work.

Sinai Peninsula is an important part of the Egyptian territories as it represents about 6% of the total area of Egypt, that is to say one and half times larger than the total exploited area of Egypt as farms, cities, residential areas, industrial areas .....etc. Besides, it enjoys a unique geopolitical location. In the same time, it is becoming increasingly clear that in view of the present population growth rate in Egypt, the reclamation of more and more desert areas is an important prerequisite to face the food problem for the present and next coming generations.

One of the areas that has been proved to be promising as to its soil and groundwater resources is the area of El-Qaa Plain, lying in southwestern Sinai, parallel to the Gulf of Suez.

2. Scope and objectives of the work.

Within El-Qaa Plain, the area lying in its middle has been selected to be the subject of the present study for the above mentioned reasons besides the following ones:

a) It occupies the middle part of El-Qaa plain where previous exploratory works have revealed that the Post Miocene sediments (El-Tur group) has its maximum thickness including an aquifer with a reasonable thickness, relatively shallow depth to water and moderate water quality.

b) This part of El-Qaa plain is served by a good road system that links it to most parts of Sinai as well as Suez and Cairo.

c) Most of the works carried out in this area with the purpose of studying its water resources was on an exploratory level, while more detailed works are needed to plan for the development of the area, based on its groundwater resources.

So, the main objective of the present work is to study and evaluate the Quaternary aquifer in the middle part of El- Qaa plain in a more detailed way than that carried out before. This is important to avoid the results based on interpolation between the relatively few locations on which previous studies have been based, and to come up with a more realistic picture about the groundwater resources of the area. This would be achieved through the following:-

1- Recognizing the Geology of the area in view of the previous geological works.
2- Carrying out a detailed geoelectrical resistivity survey covering the area of study.
3- Interpretation of the geoelectrical measurements to determine the aquifer geometry and characteristics.
4- Using the available data of some drilled wells such as electric logs, lithologic logs, and pumping test data in the area to determine the hydrologic parameters of the Quaternary aquifer, and its relation to the concluded geoelectrical parameters.
5- Collecting water samples from the drilled wells for chemical analysis in order to evaluate the water quality of the Quaternary aquifer.
6- Representing the results in the form of tables, diagrams, maps and cross sections.
7- Recommending –within the study area- the sites of relatively high developmental potential based on groundwater resources.

3. Location of the study *area*

El-Qaa plain occupies the southwestern part of Sinai Peninsula and is defined by latitudes 28° 00′and 28° 40′ N and longitudes 33° 24′and 33° 54′ E. It is mainly covered by sedimentary deposits surrounded by igneous and metamorphic Pre-Cambrian rocks, and is separated from the Gulf of Suez by Gebel Qabaliat. The middle part of El – Qaa plain which is the main part studied here - starts from El-Tur City in the south and extends northwards for about 20 km. with an area of about 200 km^2. This part is bounded by the Gulf of Suez from the west, and the topographic contour 100m from the east. It is actually separated from the Gulf itself by Gebel Qabaliat (Fig. 1).

4. Review of the previous geophysical works:

Most of the geophysical works previously carried out in the area was with the purpose of exploring the oil potentiality of the area, this included mainly gravity, airomagnetic and seismic exploration works. However, these works have contributed pretty well to understanding the stratigraphic and structural setting of the area. On the other hand few geoelectrical studies have been carried out in the area on a rather reconnaissance level to study the groundwater resources in the whole plain. Among the geophysical studies are the works of, Geofizica(1963); Kamel and Fouad (1975); Webster and Riston (1982); Shendy (1984); Rizkalla (1985); Abdelrahman, et. al. (1987); Tealeb and Riad(1987); Meshref and El-Kattan (1989); Ibrahium and Ghoneimi (1992); and WRRI& JICA (1999). From the previous geophysical studies, the results of only those having a direct bearing on the groundwater resources of the study area can be summarized as follows:

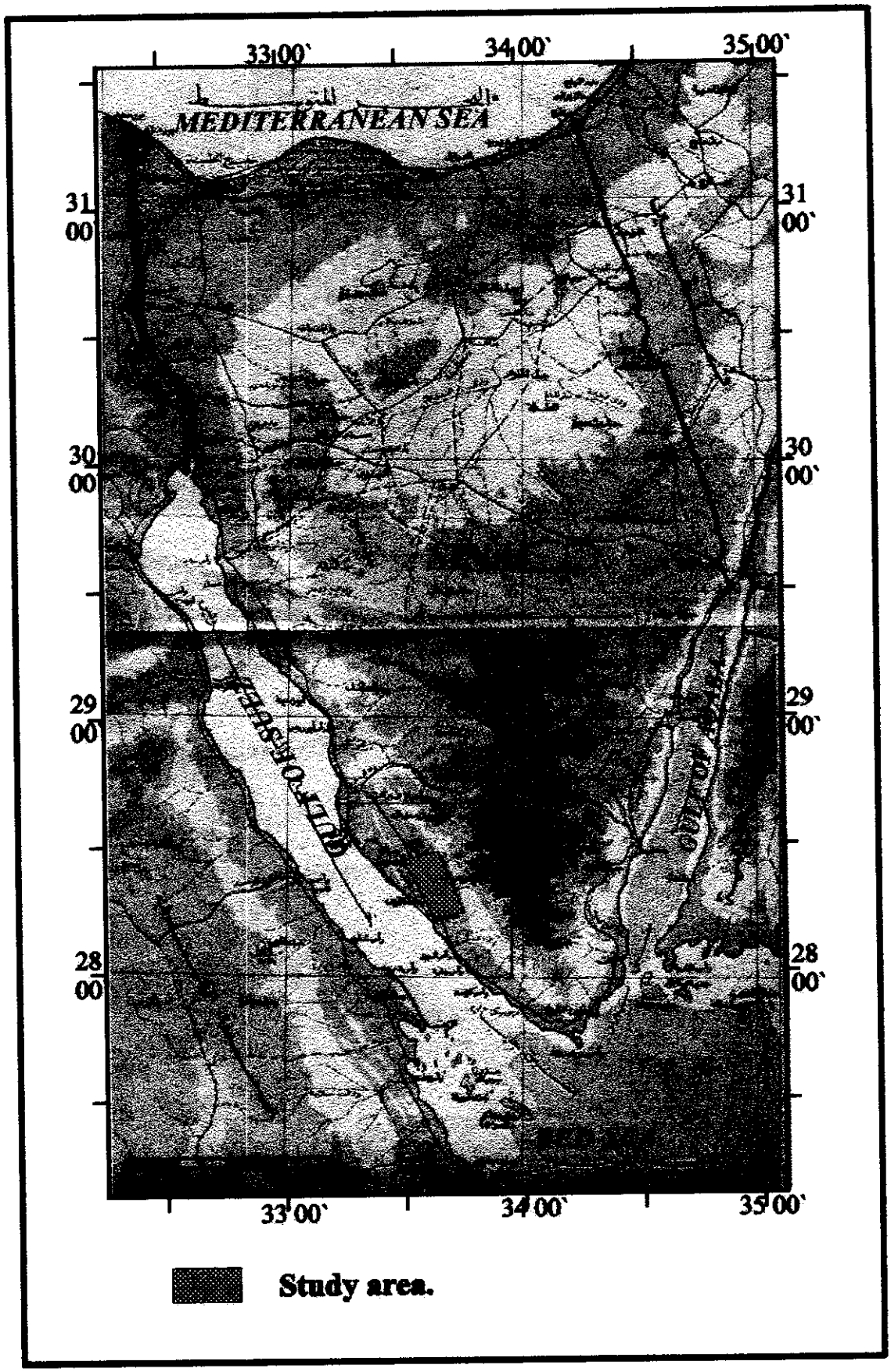

Fig.(1) Location map of the study area.

1- Most of the prevailing structural elements, (mainly faults) exhibit trends which are more or less parallel to the Gulf of Suez.

2- Based on the gravity modeling of El-Qaa plain, the depth of the basement and structural configuration were found to be affected by major faults of N45°W trend which created a wide faulted zone dissected by other minor faults of other trends e.g. E-W, N10°W, and N65°E.

3- The airomagnetic map of Southern Sinai shows that the magnetic anomalies have very high frequencies, reflecting relatively shallow sources. They may reflect shallow basement rocks in the southern part of El- Qaa plain. Also the areomagnetic map reflects four major tectonic trends namely N65°W(WNW), N45°W(Gulf of Suez), N65°E (Syrian arc) and EW trends.

4- The plain represents a structurally- controlled basin, which is bounded on both sides by two major NW faults.

5- Seismic survey pointed out to the presence of a synclinal half- graben structure. It is also indicated that the thickness of the Miocene and Post- Miocene formations increases towards the northern direction.

6- The sedimentary succession at El-Tur, (El-Tur group) consists of thick sections of sands and gravels overlying the Miocene deposits in the southern part of El-Qaa plain and the basement near the eastern mountainous area.

7- The thickness of the Quaternary deposits increases gradually west-wards towards the gulf coast.

8- The electrical resistivity of the water-bearing formation varies from 1-2 Ohm.m for in the coastal area, to 100-200 Ohm.m in the mountainous areas.

9- The electrical resistivity of the youngest sediments and alluvium

varies from 200 Ohm.m to more than 5000 Ohm.m and, in most cases, between 500 to 5000 Ohm.m. This difference is due to the horizontal and vertical alternations of loose sands, gravels and boulders.

10- In El-Tur area, there is a characteristic geoelectrical layer with a resistivity of about 8-12 Ohm.m which corresponds lithologically to clays, forming the impermeable substratum of the water bearing sands and gravels. These clays and sandy clays disappear towards the granitic massive eastwards.

11- Depending on the values of the apparent resistivity derived from TEM survey, the Quaternary deposits have been classified into four layers which can be summarized as follows:

Layer	Thickness(m)	Resistivity(Ohm.m)	Lithology
1st Layer	About 10	More than 50	Sand and gravel
2nd Layer	About 80	10-20	Sand and gravel
3rd Layer	More than 1000	10 or less	Sand with silt and clay
4th Layer	----------	more than 50	Basement rock