INTRODUCTION

1.1- General outlines:

Central Sinai comprises one of the most promising areas of Sinai Peninsula for sustainable development especially land reclamation and tourist expansion. In this respect the exploration and evaluation of water resources are needed.

The basic requirements are the investigation of the prevailing hydrogeologigal conditions and the ground water chemical properties and quality evaluation.

1.2- Location:

The area of study occupies the eastern portion of central Sinai (Fig. 1). It is bounded from south and north by latitudes 29° 20' 00" & 30° 10' 00" N. While from west it is bounded by longitude 33° 45' 00" and longitude 34° 45' 00" E and the Egyptian Palestinian boarder delineates the concerned area from east. The area of study is traversed by a number of main paved roads connecting the cities in central Sinai. However, the different sectors of the existed drainage basins can be accessed through number of desert tracks.

1.3-: Climatic conditions and hydrogeologic functions:

Generally, Sinai Peninsula is characterized by Mediterranean climate; it displays mild winter and hot summer. It is characterized by variable rainfall intensities from south to north and high evaporation rates. The climatic records are available from three meteorological stations namely Ras El Nqab, Nuweiba and Nekhel for the period (1988-2001) (Table no.1). Their aerial distribution and hydrogeologic function are discussed as follows:

1.3.1- Temperature:

Sinai Peninsula is characterized by long summer extends from April to October and short winter from November to March. The minimum air temperature is recorded during winter months. It varies from 1.6°C (Nekhel) to 10°C (Nuweiba). On the other hand, the maximum air temperature is recorded during summer months. It reaches 34.4°C (Ras El Naqab), 42.2°C (Nekhel) and 40.9°C (Nuweiba).The mean air temperature increases from southeast to northwest. (Fig.2).

1.3.2- Relative Humidity:

The relative humidity reaches its maximum value in January it ranges from 42.5 % (Ras El Naqab) to 67.9 % (Nekhel). The minimum values ranges between 25.6 % (Ras El Naqab) and 48.5 % (Nekhel) in April. Generally the relative humidity values are higher in winter than summer. Relative humidity values increase from northeast to southwest. (Fig.3).

1.3.3- Precipitation (mm/year):

Precipitation is represented by rainfall, snowfall and dewfall (condensation of atmospheric vapor). There are no available records of snowfall and dewfall. Central Sinai receives large amounts of rainfall mainly in winter months. According to the prevailing desert climatic conditions, such rains mainly precipitate as heavy showers, nearly between October and May. The mean annual rainfall increases from southwest to northeast direction (from 18.6 mm / year at Nekhel to 60.9 mm/year at Ras El Naqab). (Fig.4)

The maximum rainfall per day reaches 9.5 mm in May (Ras El Naqab), 2.9 mm per day in February (Nekhel) and 8 mm / day in January (Nuweiba).

1.3.4- Evaporation:

Evaporation and evapotranspiration plays a principal rule in the ground water regime. Evaporation is the direct water loss from the open surface water bodies. While evapotranspiration is the loss of water as a vapor through plant leaves and from soil moisture (Chow et al**.,** 1988**).** Evaporation rate is generally affected by air temperature, relative humidity, wind speed and solar radiation. The maximum mean monthly value is recorded at Nekhel area in June (8.9 mm/day) while the minimum mean monthly value is recorded at the same station in January (3 mm/day). (Fig.5).

1.3.5- - Aridity:

The degree of aridity is obtained by the application of Emberger's formula (1955), as follows:-

$Q = 100 R / (u + m) (u-m)$

Q: degree of aridity

R: mean annual rainfall (mm)

u: mean maximum temperature for the warmest months.

m: mean minimum temperature for the coldest months.

In the area of study, the degree of aridity ranges between 1.16 (Nehkel) and 5.2 (Nuweiba). According to Emberger's classification; the value of aridity ranges between 0 and 20 reflects desert climate, while those lying between 20 and 45 indicate arid climate. Thus the area of study lies mainly within the desert condition.

1.4 - *previous work:*

Centeral Sinai attracts attentions of many workers since the works of Hume (1906). Various studies relating the geology, geomorphology and water resources in the concerned area among them are; Ball (1916), Awad (1946), Farag et al (1955), Shata (1959) and (1960), Said (1962), Al Far (1966), El Shazly et al. (1974), Saad et al (1980), Hammad (1980). Jenkis et al (1982), Boukhary and Abdel Malik (1983), Philip et al. (1988), El Ghazawi (1989), JICA (1992), Mostafa A.R. &Kalil, M.N (1989), Hasanein (1997) and Shabana (1998).

1.5- Scope of the present work:

The main target of the present work is the study of the impact of the geologic and geomorphologic setting on the water resources in eastern portion of central Sinai area (W. Abu Turaifya, W. El Rouaq, W. Oqaba and W. Gerafi). The geomorphologic, geologic and hydrogeologic characteristic as well as hydrogeochemical characteristic and evaluation of groundwater for different purposes were studied. This was accomplished through field measurements, laboratory analysis and interpretations.

1.5.1- The field works are concerned with the following activities:

1- Identification of the sedimentary surface exposures represents the main rock units of the area of study.

2- hydrogeologic measurements and sampling of 28 water points representing the available water bearing formation.

3- Collecting rock samples representing the water bearing formations.

4- Identification of some field relationships concerting the influence of the prevailing landforms, lithostratigraphic units and the main structural elements upon the hydrogeologic setting.

1.5.2- The laboratory and office works include the following activities:

1- Geomorphologic and hydrographical analysis which concerned with the detection of the following items:

- Demarcation of the main landforms.
- The morphometric and hydrographic drainage parameters and their hydrogeologic significance through topographic maps.
- The structural and drainage lineation analysis.

-Surface runoff estimation by using empirical formulas.

1.5.3- Analyses of raw data of two pumping tests.

1.5.4- Chemical analyses of 28 groundwater samples.

-Graphical representation of hydrochemical data and hydrogeochemical interpretations.

The results are discussed through the following chapters:-

Chapter I: Introduction

Chapter II: Geologic setting; this chapter concerns with the general strategraphic divisions, the structural elements in the study area and their hydrogeologic implications.

Chapter III: Geomorphology and surface hydrology; this chapter concerns with the general characteristics of the main land forms as well as the quantitative analyses of the drainage basins.

Chapter IV: Hydrogeologic setting; this chapter concerns with the hydrogeologic conditions, the characteristics of the available water bearing formations belong to wide range of geologic time from Lower Cretaceous to Quaternary.

Chapter V: Hydrogeochemical setting and groundwater evaluation; this chapter deals with the hydochemical properties, hydrogeochemical systems and quality evaluation of groundwater.

Chapter VI: Summary & Conclusions