

Geologic and geomorphologic impacts on the water resources, Tushka area and its vicinities, South Western Desert, Egypt.

A Thesis from

Sayed Mosaad Mohamed Ahmed Alfaran

(B. Sc., Geology and Chemistry, Cairo University) (M.Sc., Hydrogeology and Petroleum, Cairo University)

Submitted For The Doctoral of philosophy Degree in Geology (Hydrogeology)

To Geology Department, Faculty of Science Ain Shams University

Supervision Committee:

Prof. Dr. Ezzat Ali Korany

Professor of Hydrogeology, Faculty of Science, Ain Shams University

Prof. Dr. Tarek Ali Aggour

Professor of Hydrogeology, Geology Department, Desert Research Center

Prof. Dr. Alan E. Kehew

Professor of Hydrogeology, Geosciences Department, Western Michigan University

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APPROVAL SHEET

Supervisors

PROF. DR. EZZAT ALI KORANY

Professor of Hydrogeology, Faculty of Science, Ain Shams University)

PROF. DR. TAREK ALI AGGOUR

Professor of Hydrogeology Geology, Department, Desert Research Center)

PROF. DR. ALAN E. KEHEW

(Professor of Hydrogeology, Geosciences Department, Western Michigan University)

Referees

PROF. DR. IBRAHIM ZAKRIA EL SHAMY

Professor of Hydrogeology, Faculty of Science, Helwan University)

PROF. DR. AHMED GABER SHEDID.

Professor of Hydrogeology and Dean of Faculty of Science, El Fayoum University)

PROF. DR. EZZAT ALI KORANY

Professor of Hydrogeology, Faculty of Science, Ain Shams University)

PROF. DR. TAREK ALI AGGOUR

Professor of Hydrogeology Geology, Department, Desert Research Center).

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Abstract

Tushka area represents a small portion of the Western Desert of Egypt, which is a part of the Sahara Desert. It comprises different geomorphologic units; Lake Nasser, alluvial plain, Tushka depression, hilly areas, sandy plain and erosional plains. Eleven lithostratigraphic sections were measured and sampled from the study area and three geological cross-sections were constructed. They revealed that the area consists of a sedimentary succession ranging in age from The Paleozoic to Quaternary and overlies the Precambrian basement rocks. Petrographically, the Nubia Sandstones are formed of arenites and less commonly wackes having well-developed porosity and permeability. The Nubia Sandstone aquifer system in the studied area is built up of three water-bearing formations, namely; Gilf, Abu Simble and Lake Nasser. They are connected directly either laterally or vertically and range in age from the Paleozoic to the Upper Cretaceous. In the study area the structural setting plays an important role in the groundwater configuration. The NW-SE faults are responsible for the groundwater recharging from Lake Nasser. Local fault blocks were developed and resulted in the formation of different types of groundwater aquifers which are laterally and vertically connected. The obtained results indicate that Nubia sandstone aquifer system in Tushka- Abu Simbel area receives continuous recharge due to the difference of heads between the aquifer and the lake. The hydrogeological impacts of such recent recharge are investigated by the present work which at the same time confirm the potentials of such recharge to the Nubia Sandstone aquifer. An increase of the aquifer saturated thickness associated with the increase of the aquifer potentials and rising up of the groundwater levels in the area are defined. The investigated fresh Nile water type mixed with other groundwater types in storage reflects another sort of the concerned hydrogeological impacts. The lateral distribution of the natural isotopes in the groundwater of the aquifer system in the studied area confirms the potentials of these impacts.

Key Words: Geomorphology, Geology, Hydrogeology,. Groundwater recharge. Nubia Sandstone aquifer. Tushka- Abu Simbel area.

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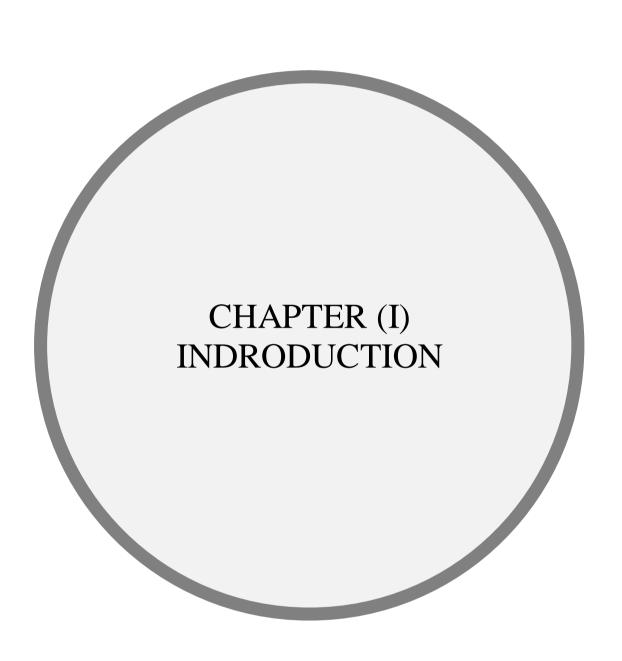
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CHAPTER (I) INTRODUCTION

1.1-General Outline:

The development of the Egyptian Deserts and establishment of new communities and settlement are among the urgent national targets. Applicable strategies through serious interdisciplinary investigations and evaluation should be managed. Great attentions and excessive efforts are made by the various Egyptian authorities to achieve and realize this aim throughout the great national projects including land reclamation, tourist investment and mining activities...etc

Egypt occupies an area of one million square kilometers. The inhabitant part occupies only about 8% of that area and more than 90% of the territories are deserts. The present cultivated land doesn't have the potential to provide the food to face overpopulation problems. Venturing into desert and reclaiming new lands becomes an urgent task to cope with the excessive requirements of their increasing populations. Aggressive polices are adapted to develop and exploit their surface and groundwater resources.

1.2- Study area:

Western Desert represents the great part of the Egyptian land. It occupies about 68 % of a total area of Egypt. The Western Desert is characterized by an arid to hyper arid climate. Numerous depressions and series of sand dunes are recorded reflecting an active denudation, paleogeologic conditions and the arid climate.

Tushka area occupies a small portion of the Western Desert of Egypt. It is bounded by the western shore of Lake Nasser from the east, adjacent to East Oweinat to the west and Sudanese borders to the south. It is located between latitudes 22⁰ 36' and 23⁰