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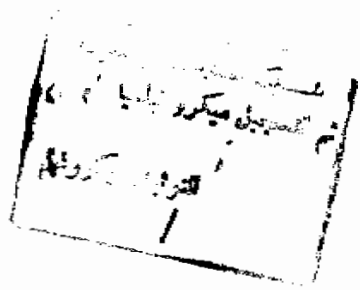

NUMERICAL MODELING FOR GROUNDWATER CONDITIONS IN WEST TAHTA AREA

THESIS

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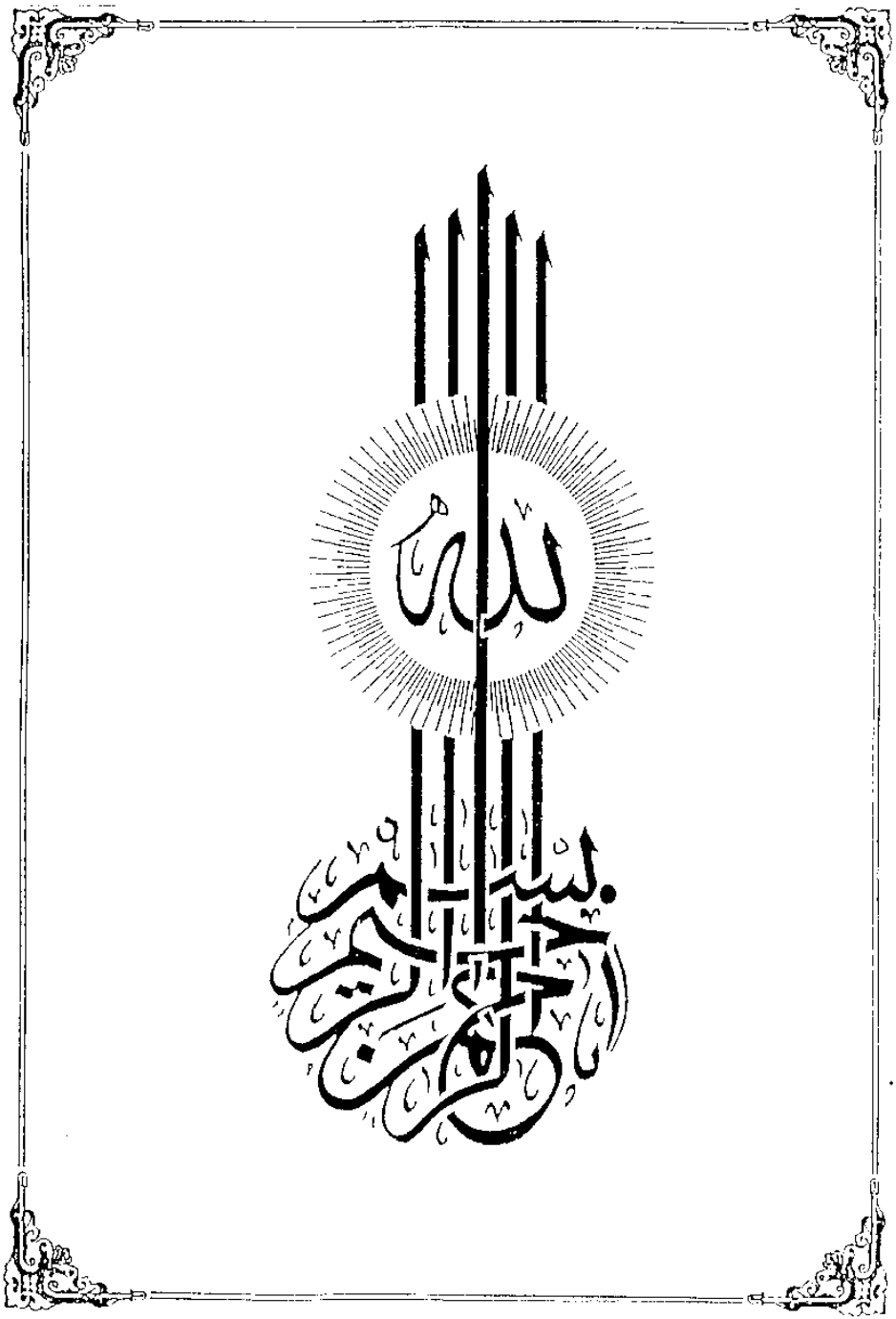

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CHAPTER 1
INTRODUCTION

CHAPTER 1

INTRODUCTION

1.1 Statement of the Problem

Egypt lies within the arid belt of North Africa and South West Asia. Ancient Egyptians in the Nile Valley and Delta used groundwater to supplement irrigation during the draught period. Nowadays groundwater is currently widely used for agricultural and drinking purposes in the fringes of Nile valley and Delta areas, which present the reclaimed desert areas and coastal zones.

Groundwater has started to play an important role in Egypt, and the other arid countries. Preliminary estimates carried out indicate that about 500 billion m^3 of groundwater is available in the Nile Valley and the Delta. The annual abstraction of groundwater for domestic, industrial and agricultural purposes in Egypt is estimated at about 2.6 billion m^3. In the coming decades the annual extraction is expected to be increased by about 90%, to 4.9 billion m^3, which is approximately equivalent to the annual recharge rate.

In hydrological terms, the Nile Valley is a long narrow basin. Since the precipitation is negligible, there is only one source of replenishment: Nile water from High Dam. Due to the continuous growth of population and the urgent need for food security, expanding the reclamation of new lands within the unlimited desert area of Egypt, has started with the desert fringes of the Nile Valley and Delta. So, the groundwater becomes an important integral part

of the water resources of the national policy. Extensive area of traditionally cultivated lands in the Nile Valley have become waterlogged and salinized since adjacent reclaimed desert lands are cultivated and irrigated. Groundwater seepage occurs through the aquifer according to topography from the high reclaimed area to the low-lying old land. Due to the increase in the piezometric head, upward flow from the aquifer to the semi-confining layer occurred and the problem took place. Hence, the water table level in the semi-confining layer increased till it reaches a dangerous stage in the low cultivated lands adjacent to the fringes.

In West Tahta about 5000 feddans (21.3 km^2) of desert lands were reclaimed along the fringes of the Nile Valley, adjacent to the traditionally cultivated area, in 1978. Figure (1.1) shows the location of the study area. The topographic level of the reclaimed area of West Tahta is 10 to 25 meters above the level of the ground surface in the adjacent traditionally cultivated lands. To supply the reclaimed desert area with irrigation water, four surface water pumping station and a system of irrigation canals were constructed. The main and lateral irrigation canals are not lined and the soils are sandy. So, the subsarface water losses due to leakage from the irrigation canals and irrigated areas into subsoil are considerably high. This leakage makes continuous recharge and seepage from the high reclaimed areas to the low traditionally cultivated areas. Consequently a strip of 600 meters (1000 feddans) of traditionally cultivated lands is severely affected by waterlogging and salinization. Figure (1.2) presents the land use for the study area.