بسم الله الرحمن الرحيم

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تم رفع هذه الرسالة بواسطة / مني مغربي أحمد

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات: لا يوجد

Hydrogeological Assessment and Water Resources Management of Hodein and Rahaba Hydrographic Basins, Halaib-Shalatin Area, South Eastern Desert, Egypt

A Thesis submitted in Partial Fulfillment of the requirement for the Master Degree in Science in

Geology

By

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Note

The present thesis is submitted by Rania Mohsen Ragab to the faculty of science, Ain Shams University in partial fulfillment of the requirements for the degree of Master of Science in Geology (Hydrogeology).

In addition to the research work performed in this thesis, the candidate has attended eleven post-graduate courses for the academic year (2013-2014), in the following topics:

- Field Geology.
- Statistical Geology.
- Physical Properties of Rocks.
- Formation Evaluation.
- Hydrogeology.
- Hydrodynamics.
- Sedimentary Petrology.
- Lithostratigraphy.
- Structural Geology.
- Sedimentation.
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In Septermber 2014 she has successfully passed the final examination of these courses

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ABSTRACT

Water scarcity is the main problem in arid and semiarid regions such as Halaib-Shalatin area, southeastern part of the Eastern Desert. The present work concerning with study of the water resources which represent very vital for developing new Settlements and domestic infrastructures**.** In the present study several controlling factors on the water resource such as geomorphologic features, geologic setting, soil characteristics, hydromorphometric analysis, climatic condition, runoff estimation, hydrogeologic condition, hydrochemical characteristics and quality evaluation of surface and groundwater**.** Nonconventional methods and techniques are applied to study these controlling factors such as Enhanced Thematic Mapper Plus (ETM+) landsat satellite images (EarthExplorer), geographic information systems,The SRTM 90 m DEM's have a resolution of 90 m and Watershed Modeling System (WMS 8.4 @ Aquaveo). Rahaba - Hodein surface areas are built up of Precambrian basement rocks, Upper Cretaceous rocks and Quaternary deposits. The elevation of the study area ranged from 2 to 1400 m above sea level with slope degree less than 5° (very gentle) at down stream portions and slope degree more than 35° (very steep) at up stream portions. The Red Sea Mountains represent about 80 % of the surface area which represent the most important groundwater bearing due to its great extension and high fracture system in the form of igneous and metamorphic rocks. The mean annual precipitation ranges between 25-100 mm. Quantification of surface runoff estimated from rainfall depth by using HEC-1 (SCS) and TR-55 Modelling from WMS 8.4© (Watershed Modeling System). Hutib subbasin has the highest peak and runoff values but flash flood probability is low. Al Abyad sub-basin has the high peak and runoff values and flash flood probability is very high, so some dams and dykes must

be constructed at the crossing point between the third and fourth stream order for infiltrating and recharging the shallow aquifer.

Kirayjah, Naam, El Dif and Madi sub-basins have high peak and runoff values, these basins reflect high probability of flash flood. The suggested protection system at Hodein catchment area must be at Kirayjah sub-watershed.

Appling weighted spatial probability model (WSPM) for determining the potential sites for runoff water harvesting. High tovery high runoff water harvesting potentiality classes are occupied Rahaba main channel and El Dif Hodein sub-basin. The optimum area for water resources/land use and groundwater recharge in Rahaba basin is Hutib sub-watershed and El Naam, El Dif and Emrit Hodein sub-watersheds.

The water resources in the study area are Shalatin sea water desalination plant for domestic purposes, the drinking water and cooking water are brought from vehicles transport water from the city of Idfo on the River Nile to Shalatin and natural springs, hand dug wells and shallow drilled wells.

The groundwater is available from two main aquifers belonging to Upper Cretaceous and Precambrian times. Twelve water points are hydrogeologically investigated which comprise 4 springs, 6 hands dug wells and 2 shallow drilled wells. Eight samples are collected from Upper Cretaceous sandstone aquifer; the TDS varies from 487 mg/L (Fresh water) at Abu Saafa2 to 1433 mg/L (Slightly Saline) at Abu Saafa 4. Most of them are characterized by fresh water (Abu Saafa 3, 2, 1, Gombeet, Ain Abraq and El Sunta) while other points are slightly saline (Abu Saafa4 and Bir Abraq). Four water samples collected from fractured basement with salinity values varies from 458 mg/L (fresh water) at Bir Gahelia 2 to 2153 mg/L (slightly saline) at Bir Mekeel. Water samples of Bir Gahleia 1 and 2 are dominated by calcium and magnesium bicarbonate salts which reflect meteoric origin

(fresh water), while Bir Iqaat and Mekeel groundwater due to leaching of evaporates terrestrial salts by meteoric water. Upper Cretaceous sandstone aquifer groundwater samples of Abu Saafa1, 2, 3 and El Sunta occupied mixed zone these water samples are dominated by calcium, magnesium chloride and sulphate salts. Bir Abraq, Ain Abraq and Gombeet placed near mixed zone and sodium chloride zone. Bir Abu Saafa 4 reflects sodium chloride water type. All groundwater samples are suitable for drinking except Bir Iqaat and Bir Mekeel due to their high salinity. Evaluation of groundwater quality for irrigation purposes Ain Abraq and Bir Gahelia 2 are categorized under good quality and non-limited use while Abu Saafa1, 2, 3, El Sunta, Bir Abraq, Gombeet for Upper Cretaceous aquifer and Bir Gahleia 1 are under some limited use. Abu Saafa 4, Mekeel and Iqaat are under moderate limitation which need leaching at higher range to use in irrigation.

Keywords: Shalatin, Eastern Desert, Egypt, Rahaba hydrographic basin, Hodein hydrographic basin, Hydro-morphometric parameters, runoff water harvesting, Hydrogeology and Flash floods.

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