

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

**Geoelectrical Investigations of Groundwater Aquifers in
Part of the Eastern Nile Region, Khartoum State, Sudan**

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DEDICATION

To the soul of my father

To the soul of my mother

To my wife, my sons and my daughters

To my sisters and brothers

To my friends

To who encouraged me to complete this work.

Omer

ABSTRACT

The human activities and poor salinity water-management in study area has lead to serious deterioration of the water quality as well as depletion of the quantity.

The main objectives of the study is to detected the thickness and feature of the of the sedimentary layers and to evaluate the ground water potential and determines the salinity by using hydrogeophysical surveys.

The study area lies east of the Blue Nile in Khartoum State. It is has an area of 180Km² and lies between latitudes 15° 31' & 15° 35' N and longitudes 32° 35' & 32° 51'.

The main objectives of the study is to detect the thickness of sedimentary layers and to evaluate the groundwater quantitatively and qualitatively as well as to determine the source of its salinity throughout the geological, hydro chemical analysis and electro geoelectrical methods.

The methodology of the study included field work when 24 vertical sounding points were measured. And well location was determined by GPS and about 33 water samples were collected for chemical analysis. Office work included of GIS, SURFER, IWIN2P, CHEMTEST, AQUICHEM, IXID, GPS.

Geoelectrical survey demonstrate the of mudstone layers which has a thickness ranging from 1m to 7m.

The results were presented in the form of hydro geological maps and geoelectrical plots and sections.

The study area is covered mainly by Nubian sandstone, shows that main water-bearing Strata are sandstone and conglomerate in the Nubian sandstone formation, it has a thickness rang from 10m to 250m, over lained by superficial deposits . They form two ground water aquifers (upper and lower) separated by mudstone layer at the NE and fine grains size sand in the southern and southeastern parts of the area.

The salinity increased in northern and northeastern parts of the study area but decrease to south and southeastern parts.

The thickness of the lower aquifer in south is greater area than the northern part of the area.

The results show that the water is of (Ca-Mg-HCO₃) type near the Nile and sodium, chloride Bicarbonate (Na,Cl,HCO₃) and sodium, chloride sulfate (Na-Cl-So₄) water type at the centre and eastern part of the area.

The area shows high salinity in northern and northeastern parts of the area was attributed to the concentration of evaporates gypsum and carbonates.

خلاصة

تأتي أهمية الدراسة الحالية من أنّ النشاطات السكانية المتزايدة وضعف إدارة المياه المالحة ومعالجتها قد أدت إلي تدني نوعية المياه، تقع منطقة الدراسة شرق النيل الأزرق - ولاية الخرطوم.

الهدف من هذه الدراسة معرفة الطبقات المكونة للمنطقة وتقييم المياه الجوفية كميًا ونوعيًا ومعرفة مصادرًا لملوحة والتي اعتمدت الدراسة لتحقيق الاهداف المذكورة علي أساليب جيولوجية، هيدروكيميائية، وطرق جيوفيزيائية كهربية.

تغطي تكوينات الحجر الرملي النوبي معظم منطقة الدراسة وهي تمثل الخزان الجوفي الرئيسي بالمنطقة. والطبقات الرئيسية الحاملة للمياه الجوفية هي الحجر الرملي والحجر الخرساني ويتراوح سمكها حوالي ١٠متر إلي ٢٥٠متر. تعلو هذه التكوينات الرسوبيات الحديثة وهي تشمل رواسب الفيضانات والأودية والمساطب النهرية والسبخات البحرية.

يتكون الخزان الجوفي من نطاقين علوي وسفلي يتدرج انحدار منسوب المياه كلما ابتعدت المسافة من النيل الأزرق.

الملوحة تزداد في اتجاه الشمال والشمال الشرقي وتتناقص في الجنوب والجنوب الشرقي من منطقة الدراسة.

الخزان الجوفي السفلي أكثر سمكا من الخزان العلوي كما انه اقل ملوحة من العلوي وسميك في الجزء الجنوبي من المنطقة أكثر من الجزء الشمالي.

بالتحليل الكيميائي وجد ان المياه بالقرب من النيل تتميز بنوعية المياه كالسيوم- بيكربونات - ماغنسيوم وفي وسط وشمال شرق المنطقة بنوعية صوديوم- كلور - كبريتات.

تزداد الملوحة في اتجاه الشمال والشمال الشرقي للمنطقة وهذا نتيجة للتركيز العالي للجيبص والكاربونات، وبالرغم من وجود ارتفاع في الملوحة فهن نوعية المياه الجوفية في حوضي الخزان النوبي جيدة وصالحة للاستعمل في بعض الاغراض.

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