



CWW2024

Water and Climate: Building Resilient Communities

13th – 17th Oct 2024

Triumph Luxury Hotel,
Cairo – Egypt.

Investigation of aquifer connectivity
in South Egypt: Implications for
economic sustainable development
By: Ibrahim Ahmed

Biography

I am **Ibrahim Ahmed**, a teaching and research assistant, Geology Department, Faculty of Science, Assiut University. I obtained a Bachelor's degree in 2019 in "Geophysics" from the same university with Excellent grades with an honor degree. I aspire to build a research career in hydrogeology and hydrogeophysics. I seek to contribute to discussing the essential environmental issues and introducing the best solutions to adapt to the fast-paced climatic changes. I started my master's degree in 2022 specifically in the field of hydrogeology and applied geophysics.

My work during the master's degree is concerned with the investigation of connectivity between deep and shallow aquifers in the hyper-arid regions and evaluating their sustainability based on feeding from deep mega aquifers. This is achieved by utilizing remote sensing data, magnetic geophysical methods and stable isotopic analyses. I hope that my works contribute to attaining the aspects of the desired sustainable development and economic support.

Affiliation: Geology Department, Faculty of Science, Assiut University, Egypt.

E-mail: ibrahimaboasem@aun.edu.eg

Abstract

The Sustainable Development Strategy of Egypt Vision 2030 depends on the understanding of groundwater resources and thus requiring a more accurate quantification of groundwater reserves.

The horizontal expansion in the desert fringes around the Nile Valley is a key strategy for agricultural and urban development projects that necessitate, in some cases, a sole dependency on groundwater resources.

The study area is located in the southern Western Desert and focuses on the areas proximal to the Nile Valley.

The area is promising for future development projects and contains new reclaimed areas under the ongoing mega-projects.

The Objective of this study is to better understand the recharge from the deep Nubian Aquifer System to the shallow aquifers via connectivity process.

Shallow aquifers, economically, mean low cost well installations and low-cost extraction of groundwater.

This study integrates remote sensing data, borehole data, geophysical techniques and stable isotopic analyses.

Large-scale remote sensing data with aeromagnetic analyses enable the mapping of both shallow and deep faults and thus facilitating the structural connectivity between the deep and shallow aquifers and controlling the flow dynamics.

Depth-to-basement map was constructed using aeromagnetic data and deep boreholes to deduce the thickness of the water-bearing formations which affects the connectivity process.

Stable isotopic analyses for groundwater samples revealed the mixing between the aquifers and the contribution ratio from the Nubian aquifer to the shallow ones.

These isotopic analyses were supported by the values of the total dissolved solids in the groundwater samples.

-The results of this study reveal that the southern and middle parts of the study area receive significant recharge from the deep Nubian Aquifer towards the shallow Aquifers.

In contrast, these shallow aquifers in the northern part of the study area don't receive significant recharge from the Nubian Aquifer and depend mainly on the Nile River.

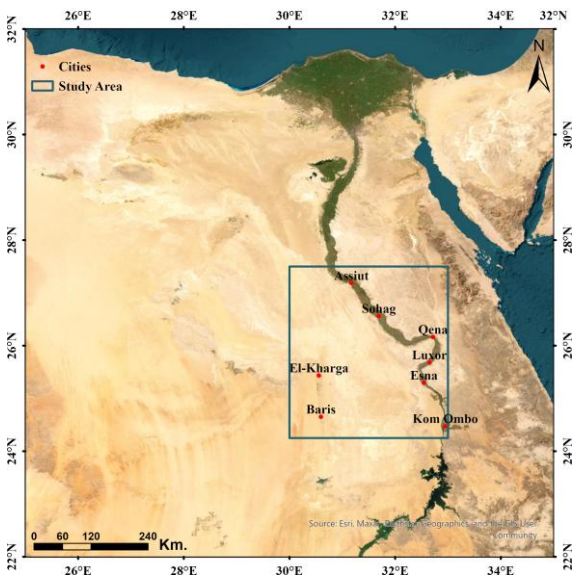
We constructed a tentative map for the feasible areas based on recharge from the deep Nubian Aquifer System to the shallow aquifers.

These areas are represented on one hundred thousand feddans in west KomOmbo which is included in the 1.5 million feddans project, and this gives a positive indication for this area.

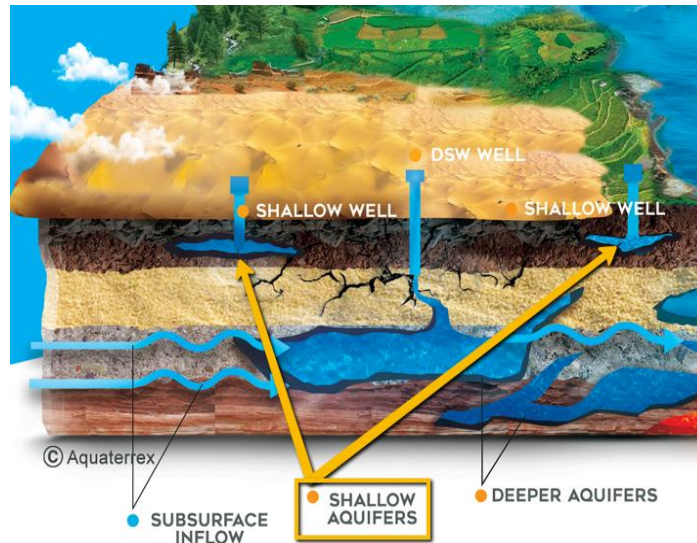
This project also can be expanded by fifteen and twenty thousand feddans in West Qena and West Sohag respectively.

This map can be presented to beneficiaries and Stakeholders to set up priorities for groundwater well exploitation needed for economic planning.

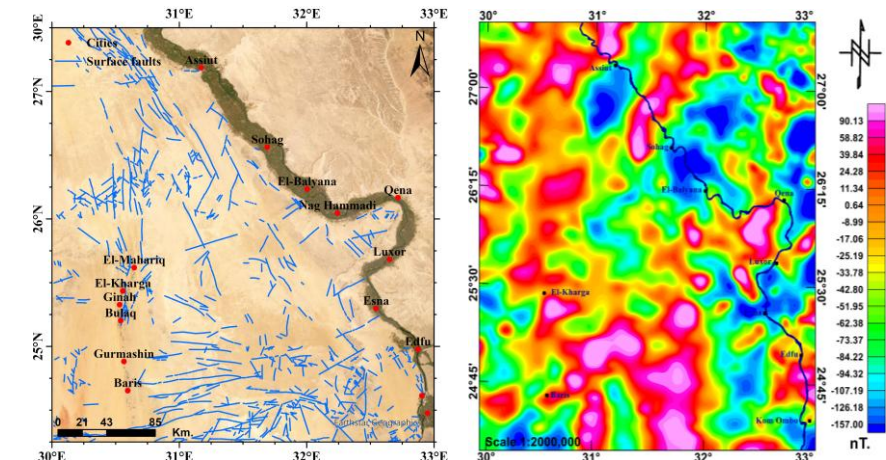
1. Study Area



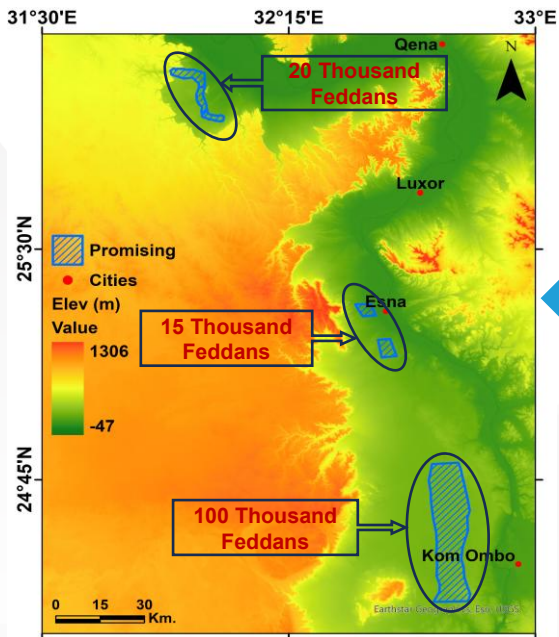
2. Objectives



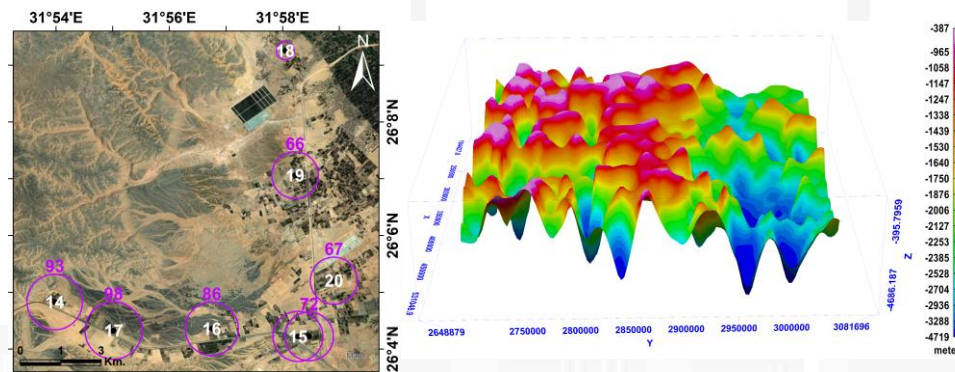
3. Methodology



5. Recommendations



4. Results



Groundwater Sampling

