

**HYDROGEOLOGICAL AND HYDROCHEMICAL STUDY OF
THE UPPER AQUIFER SYSTEM IN AZRAQ BASIN
(JORDAN)**

by

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ABSTRACT

Azraq basin forms the northeastern part of the Jordan terrains which has an area of about 12710 km². It is located between Palestine grids: 250 to 400 E and 055 to 230 N. The highest point of the basin is located at 1550 meters adjacent to Tillin town in Syria, while the lowest is at Azraq depression, 500 meter above the mean sea level. The average elevations of the basin is about 750 meter above the mean sea level. The Azraq area is a part of the limestone plateau in eastern Jordan. The northern part of this plateau is covered by volcanic rocks such as: basalt and tuff above the limestone from Rijam formation (B4), While the limestone formations (B3, B4, B5) are outcropping in the southern part of the basin. It is of tectonic origin formed between two normal faults, Fuluk in the northeast and Sirhan in the south.

The Oasis in the central part of the basin lies approximately 100 km east of Amman. Two important perennial fresh water springs which is locally known as: Shishan and Drouz, these springs are located in the central part of the basin.

The climate in the Azraq basin is characterized by two well defined seasons a hot, dry in summer and a comparatively wet, cold in winter.

The mean annual rainfall in the catchment ranges from more than 300 mm in Jebel El-Arab which is the recharging area in the north to about 150 mm in the west and less than 50 mm in the east and south. The amount of infiltration is estimated to be about 35.3 MCM. The thunderstorms rainfall form the great part of the precipitation on Azraq basin.

The upper aquifer system in Azraq basin includes the Quaternary sediments, the basalts and the limestone formations of Wadi Shallala (B5) and Rijam (B4). It is unconfined aquifer and the severe pumpage from the upper aquifer is the greatest problem in the basin and may cause salt water intrusion especially if the water levels sink below 500 meter above the mean sea level which is the static water level of Qa-Azraq area. But constructing earth dams on the major wadies to utilize the surface water in irrigation, artificial recharge to the upper aquifer and the decrease of the pumpage from the public and private sectors will overcome this problem.

The water quality in the northern part is better than in the south and southeastern parts. The total dissolved solids is ranging between 230 mg/l in the north and 700 mg/l in the Qa-Azraq area, then increase to 5000 mg/l in the east and reach 12000 mg/l in the south. Two types of water were determined in this study:

- 1 - Na-HCO₃ in the north.
- 2 - Na-Cl in the south & southeast.