ASSESSMENT OF THE QUALITATIVE CHARACTERISTICS OF GROUNDWATER IN THE AL-ABBOURQAIM DISTRICT AND ITS FUTURE PROSPECTS DISTRICTS BY USING GIS.

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ABSTRACT:

The objective of the research is to analyze and evaluate the qualitative characteristics of groundwater in the area of al-abbour in Qaim district in order to achieve optimal investment of water resources in different human uses, The spatial distribution of the geological formation showed spatial variation in the chemical properties of the groundwater. The results of the laboratory analysis showed that the salinity ratios varied from place to place,The values of dissolved salts (TDS) for the water samples of the study area ranged from 2760-6895, indicating that the well water can be invested in the cultivation of some medium and high endurance crops for salinity, as well as for human uses in industry and mining.

INTRODUCTION:

Groundwater is one of the cornerstones of the expansion of human activities due to demand for food and increasing population growth, which contributed to the investment of groundwater in the study area in order to detect underground water,In terms of their distribution, movement, physical and chemical properties and determination of their suitability for human, agricultural and industrial uses to achieve sustainable development in an optimal manner. Groundwater in arid and semi-arid regions is an important resource for addressing the acute shortage of surface waterWhich is reflected negatively on the overall human activities, especially after the increasing environmental problems in the plain sedimentary area of urban expansion on agricultural land, as well as land degradation as a result of increasing pressure by repeating the cultivation of more than one crop per year,The importance of the study to the region as being economically backward and carrying the potential and resources that make them eligible for population growth and focus their various activities.

THE PROBLEM OF RESEARCH:

Is the specific characteristics of groundwater in the study area suitable for investment under the prevailing natural conditions and available human potential

RESEARCH HYPOTHESIS:

The study area is characterized by the presence of groundwater suitable for human use, especially if invested in accordance with planning and management of the court, which would contribute to raising production levels in various economic activities.

THE AIM OF THE RESEARCH:

The aim of the research is to assess the qualitative characteristics of the groundwater in the study area and its impact on the spatial variation of the distribution and diversity of human activities.

THE RESEARCH AREA:

The study area is located in Anbar province, and extends between the two latitudes (60 33 34 - 30 31 35) north and longitudes (34 12 40 - 40 18 41) east, as shown in map (1) The Syrian Arab Republic west , the north and the north-

east of the district of Nineveh and the east of the district Rawahand the southern Al-Aubededistrict of the province. The area of study area (7348.651) Km 2.

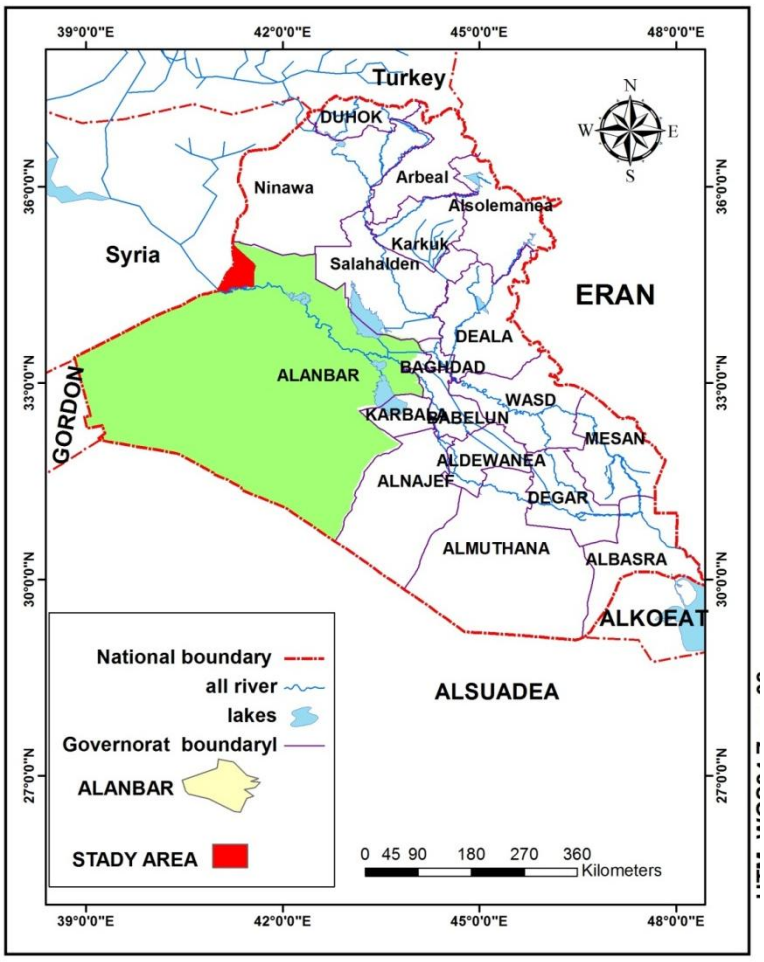
STRUCTURE OF RESEARCH:

For the purpose of achieving the research objectives, the following research was included:

The first topic: Hydrogeological analysis of groundwater:

The second topic: Analysis and evaluation of groundwater quality characteristics:

Map (1) Location of study area



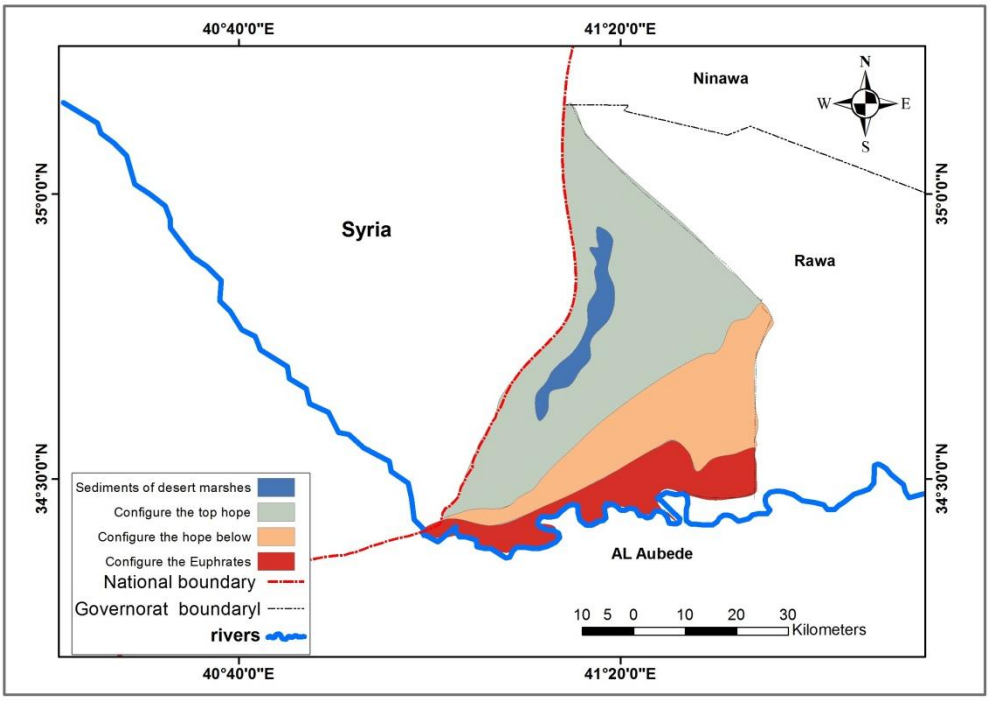
Source: Ministry of Water Resources, General Survey Authority, Anbar Topographic Map, scale 500000: 1, 2007.

The first topic: Hydrogeological analysis of groundwater:

First: Geology of the region: -

The geological structure has a large role in the distribution and variation of the quantity and movement of groundwater and its specific characteristics in the study area. The map(2) shows the existence of different geological formations, which requires detailed study as follows:

Map (2) geological formations in the study area



Source: From the work of the researcher based on the Ministry of Industry and Minerals, Geological Survey and Mineral Inquiry, Iraq Geological Map, Plate No. 1, I 3, Scale 1: 1000, 2000.

1- Triggers of triple time:

A - Composition of the Euphrates Jurisdiction: This configuration is located in the southern part of the study area along the Euphrates River. It consists of dolomitic limestone and calcareous base metals covered by a chalky child,It contains cracks, joints and caves due to the melting of calcareous components, making it characterized by high permeability and large storage of groundwater.(1)

B - Composition of the opening: This composition occupies most parts of the study area, especially the upper parts of it. It consists of several courses of sedimentary which led to the formation of green child and Marl, limestone and gypsum, the succession of these courses made this configuration in general characterized by a lack of hardness as well as cracks and joints Making it an incubator and a conduit for groundwater (2).

2 - Sediments of the four - time: -

The formation of this time along the Euphrates River, especially the deposits of the flood plain form a cover of sand, clay, silt and some different gravel sizes with the presence of stones and sand,As well as the presence of sediments of desert marshes, which were observed in the area with the Syrian border, represented by saline (Albogars and Tawila), which was formed due to the combination of water with the impact of climatic climates, including the continuous evaporation of surface water collected from the flood waters as well as the evaporation of groundwater by the poetic property.. The importance of these sediments from the hydrological point of view is considered to be one of the most important sources in the region. As a result of the high permeability and porosity of these sediments, it is one of the most important aquifers if there are underground rock layers.Second: spatial analysis of the depths of wells in the study area:

The depth of the wells of the study area varies from medium to deep, with depths ranging between (47 , 130

)m in well (5,6) respectively, as shown in Table (1) and map (3) Underground, as these depths are affected by the geological and topographic nature of the area,As well as the high permeability of the geological components prevailing in the region, which contribute to the movement of groundwater from the recharge areas towards drainage areas. The areas with high concentration are groundwater, especially the areas of water distribution and plateaus.

3- Groundwater Movement in the Study Area:

The movement and flow of vertical and horizontal groundwater depends on the size of the porosity, which depends on the quality of the soil components, as well as the size of the cracks and faults that make up the rocks of the area. The hydraulic slope also affects the movement of the groundwater. In water levels between shallow wells and deep wells [(3).]

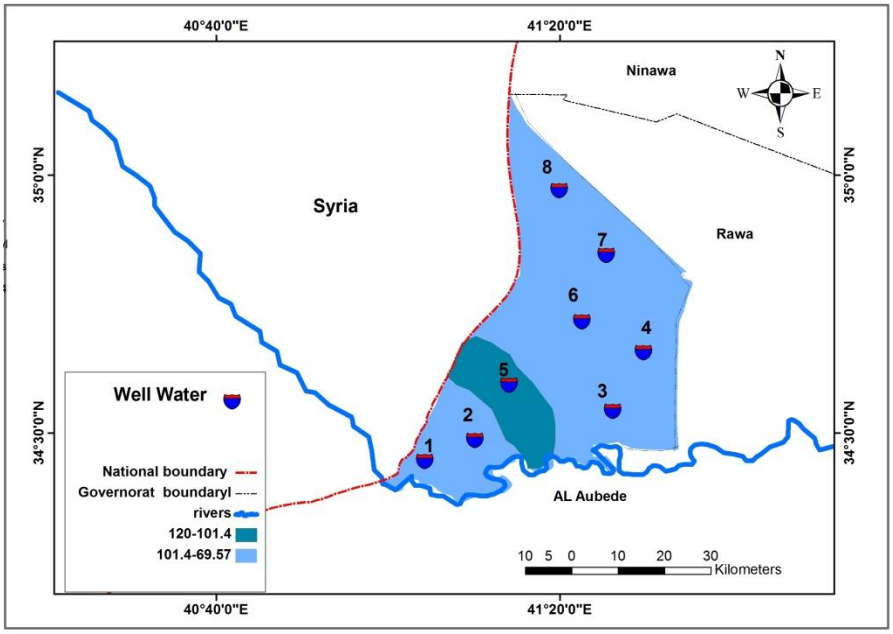
From map 4, the general trend of groundwater movement from the North and the North West to the South follows the same direction as the general slope of the area, with some curvature in its movement.

Table (1) Hydrological characteristics of wells in the study area

Total salts (mg / l)	Production capacity L / th	Depth of well / m	Wells
2760	13	120	1
3540	19	100	2
2900	11	55	3
5100	27	74	4
6895	10	112	5
2850	44	58	6
2490	10	60	7
2560	22	50	8

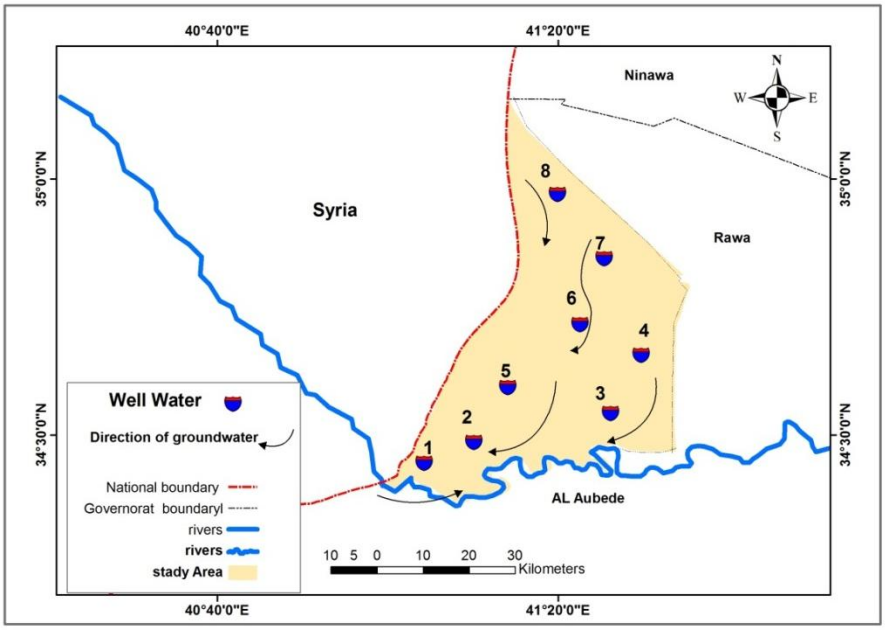
Source: From the work of the researcher based on the General Authority for Groundwater, Department of Studies and Investigations, unpublished data, 2013.

Map (3) Depths of groundwater from the ground in the study area



Source: From the work of the researcher using table (1) using: Arc map10.3.

Map (4) direction of groundwater movement in the study area

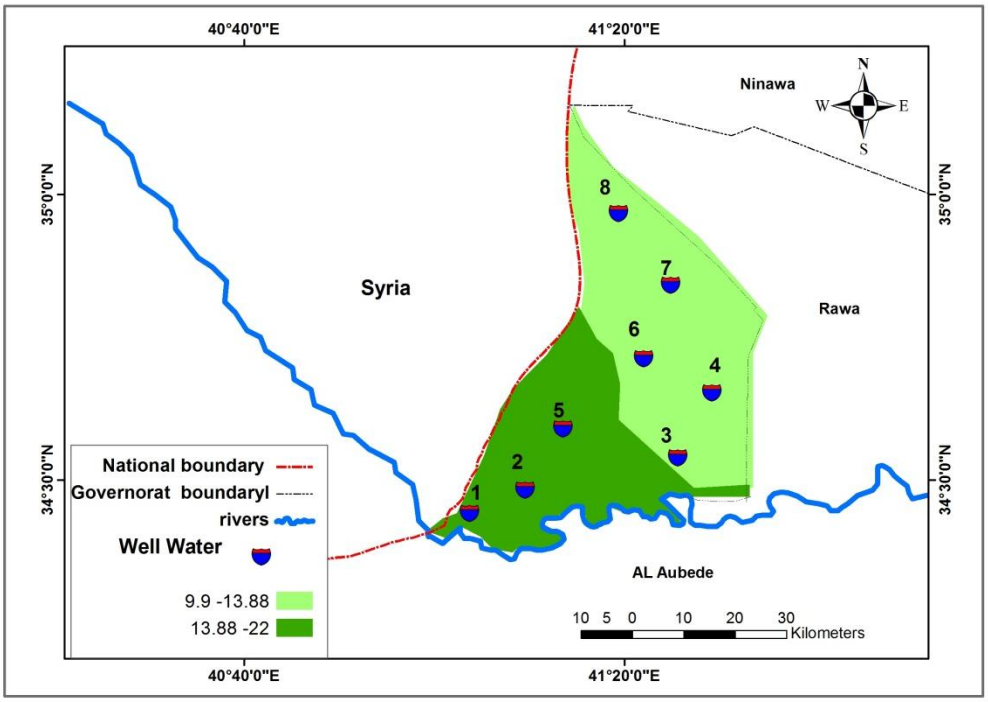


Source: From the work of the researcher based on the statement of Mohi Hussein, Mushtaq Ahmed Gharbi, spatial distribution of the provinces nominated for the exploitation of groundwater resources in Anbar province, Journal of Anbar University of Humanities, vol. (3), No. (14), 2008, p.277 Using: Arc map10.3.

4- Production capacity in the wells of the study area:

Production capacity is the amount of water produced from a specific well at a specified time, which is drawn either from pumping or artesian flow, and is usually measured at the rate of pumping per liter (second)[4] . The human misuse of these wells through the excessive extraction of water permanently and not to the urgent need to reduce their levels causing the presence of problems, including the high level of salt water as well as creating gaps in the soil and thus the occurrence of caves, which leads to the phenomenon of karst, therefore requires a balance between Extraction of groundwater and the amount of compensation in wells to help achieve the optimal future investment of groundwaterThus sustaining [5]. The production capacity and values of the water samples in the study area vary from (10 – 44) liters / second in wells (6,7) respectively, as shown in Table (1) and Map (5). The reason for the variation in productivity in the wells of the study area is due to the type of rock containing groundwater, which results in increased water movement, as well as the expansion of groundwater reservoirs feeding some of the wells from remote areas located outside the drainage basin.

Map (5) spatial distribution of production capacity in the wells of the study area



Source: From the work of the researcher using table (1) using: Arc map10.3.

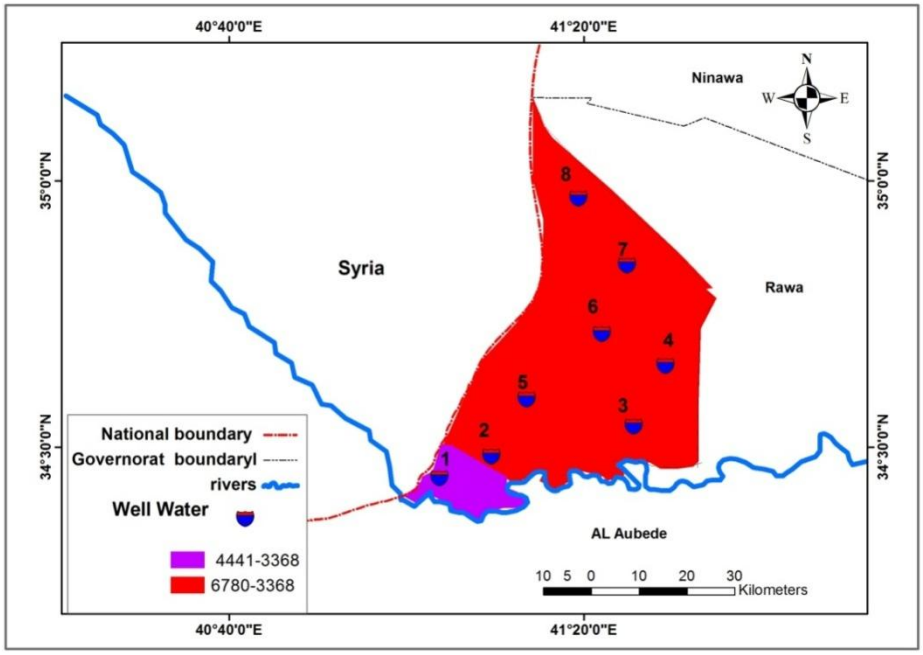
The second topic: Analysis and evaluation of groundwater quality characteristics:

1--Analysis of the specific characteristics of groundwater:

The specific characteristics of groundwater vary from place to place, due to the different class structure of the rocks and the velocity of water flow. The faster the movement of water, the shorter the ion exchange time between the water and the rock, the lower the water gain, while the slow motion is negatively affected by the time available. For ion exchange, making it more saline [6]. One of the criteria for assessing the validity of groundwater for agriculture is to know the total dissolved salts (TDS).

Desalinated salts are the most important characteristics of groundwater since they have a direct impact on human uses, particularly in the selection of human activity. The study area is characterized by spatial variation of salinity concentrations. The table data (1) and the map (6) indicate that there is a gradual increase in concentration of the salts of the wells in the study area. The dissolved salts (TDS) Between (2490- 6895) in the well (7, 5), respectively.

Map (6) Spatial distribution of salinity in the wells of the study area



Source: From the work of the researcher using table (1) using: Arc map10.3.

The type and concentration of dissolved salts in groundwater in the study area depends on the variation of the rock structure and water velocity, which is reflected in a cycle on the chemical variation of the salts in the groundwater reservoir, as well as the ion exchange and ion exchange properties. The depth of the aquifer and its rock layers, The processing and direction of groundwater movement play a major role in the variation of groundwater characteristics.

2- Evaluating the Validity of Groundwater for Human Use:

The assessment of water quality is intended to suit the various uses, especially human, agricultural and industrial, which contribute to their optimal investment. For the purpose of assessing the groundwater in the study area, the classification of the American salinity laboratory was adopted, which is based on the effect of different variables such as salinity TDS,

a. Assessment of groundwater for human and animal consumption:

The standards of the World Health Organization (WHO) [(7)] and Iraqi Standards for Evaluating the Validity of Groundwater for Drinking purposes, which are based on the total soluble salts according to the internationally and Iraq tolerable limits, have been determined. The upper limits of total permissible soluble salts are 1000 mg / L.. According to the report of the World Health Organization (WHO)while the permissible limit for drinking water was 1500 mg / l in the Iraqi specifications'[(8)] and by reading the data of Table (1) of the values of dissolved salts in well water area of the study, which ranged between (2490 - 6895) Mg / l in the well (7, 5), respectively, and therefore

not suitable for drinking, to concentrate the salt content above the limit

Hydro chemical data indicate that they are suitable for drinking animals, because their soluble salts are less concentrated than the permissible limits, and most wells fall within the minimum permissible limits, as shown in Table (2).

b. Assessment of well water for agriculture:

Agricultural activity is the most important activity practiced by the population of the region. Therefore, it is necessary to evaluate the characteristics of groundwater, as it is the main factor controlling the possibility of expanding agricultural and plant production. Since agricultural crops differ in terms of their bearing on groundwater characteristics, the study relied on several indicators to assess the suitability of well-studied wells for agricultural plant production.

Table (2) Classification of Area Wells for Animal Consumption by Classification Alttoviski

Notes	Number of wells	Specifications	Total salts mg / l
Used for all types of livestock and poultry	27	Very good	Few of 3000
used for all types of cattle and poultry with the possibility of diarrhea for livestock	12	Good	5000-3001
It causes diarrhea for livestock and for poultry	2	Acceptable	7000-5001
Causing some damage to the carriers and the young	1	Canbe realized	10000-7001
Causing significant damage	There is no	Highest use limit	15000-10001
Very high risk	There is no	write off	More then15000

Table (3) shows that the TDS of the well water in the wells (1,2,3,4,7,8) is the type that can be used to irrigate highly saline tolerant plants And need good experience when used, and wells (5, 6), the water is outside the limit for irrigation crops.

Table (3) Classification of the American Salinity Laboratory for the validity of irrigation water

Appropriate	**The degree of the variable (TDS) mg / l**
Their use for irrigation does not cause harmful effects	500
Their use may cause adverse effects on highly saline crops	1000 – 500
May cause harmful effects for many crops so their use needs news	2000 – 1000
They can be used to irrigate potentially high plants for salinity use needs to experience	5000 – 2000

L.A. Richard, Diagnosis and improvement of saline and alkalis soils, Agriculture handbook 60, U.S.A. Depart. Agri. Washington, 1954, p.160.

c- Well water assessment for industrial purposes:

Industrial uses in their production processes depend on high quality water specifications, in order to avoid the negative effects of corrosion of pipes, equipment and equipment, as well as the deterioration of the quality of production in some cases and the high economic costs due to the accumulation of salts. The salinity concentration and the high sodium ratios in the wells of the studied wells resulted in the loss of their usable capacity for industrial purposes, for the increase of their salts above the permissible limit as in Table(4). Therefore, the establishment of industrial development projects in the study area requires the availability of water within the standard specifications for this use, whether by improving the quality of groundwater or processing it from fresh surface sources.

Table (4) Proposed international standards for water in industrial applications

Total salts mg / l	Type of industry
500	Canning and beverages
1000	Oil industries
600	Cement manufacturing
1000	Chemical industries
100	Paper Industry

Hem, J.D., Study and Interpretation of chemical characteristic of natural water, 3.ed U.S.G.S. water supply paper2254, 1989.

CONCLUSIONS:

1 - The geological structure in the transit area of the existing impact on the spatial variation of the abundance and characteristics of groundwater and sources of nutrition, which reflected the different validity of human activity.

2. It was noted from the map of groundwater flow that the movement of water from the north and north west to, according to the general decline in the area.

3. Groundwater in the study area is found to vary in depth and level, and is mostly suitable for the investment process, especially when state support is available for projects in the region.

4. Total TDS values vary in the study area, which is immature in the high salinity and mineral content of some wells.

5 - The study proved that the validity of groundwater for agriculture in the study area was characterized by spatial variation in the diversity of agricultural crops, depending on the tolerability of crops to dissolved salts.

RECOMMENDATIONS:

1. Apply water harvesting technologies to ensure the periodic recharge of groundwater through the construction of dams in appropriate locations to ensure that floodwater is filtered into sub-surface layers, as well as investment of caustic geomorphological forms in the area or drilling of wells for the purpose of penetrating surface water into the bearing layers Water for the purpose of sustaining groundwater reservoirs.

2 - Organization of drilling wells and under the supervision of the competent government agencies in order to choose the appropriate places for drilling and avoid the excavation of random and legislation of

deterrent laws in this regard contribute to regulate the water balance of underground reservoirs.

3 - The need for periodic and complementary hydrographic studies of selected wells that reflect the hydrological conditions of the area in order to monitor changes in the specific characteristics of water and underground reservoirs, as well as the movement and fluctuation of groundwater levels.

4 - Expanding the use of modern technologies in irrigation (spraying and drip) and the introduction of appropriate varieties of agricultural crops in light of the availability of available groundwater and arable land in order to achieve the highest output to yield the least consumption of water resources.

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