EVALUATION OF GROUND WATER QUALITY IN SOME WELLS AT QASR KHAIR AREA

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Abstract

In this study, the water quality of the wells was assessed for six areas in the Qasr al-Ikhayyar area which are (Al-Shorfa, Al-Halifa, Oulad Hussein, Alammariyin, Al-Snad and Al-Karamda) and the Qasr Al-Ikhayyar area of the coastal areas located in north-west of Libya on a line of 13.95º degrees east and 32.7º degree north. The problem of the study is that there is a lack of irrigated crops of economic importance to the country in the study area. This is due to the salinity of the wells used for irrigation. The disappearance of some fruit trees in this area such as lemons, almonds and pomegranates is also caused by the salinity of the resulting wells of sea water intrusion. The study aims to determine the salinity concentration in surface and groundwater wells and their impact on the agricultural environment and public health. The laboratory results showed that all the areas allocated for study are completely free from microbial pollution resulting from wastewater except for the area of the terrace and have been contaminated, and this is due to the presence of some reasons, including the use of natural animal fertilizers on farms in abundance and the presence of some wells The black water sources near the study area are probably more. In terms of physical and chemical, the percentage of total salts for the samples of Regions (4,5 and 6) (Alammariyin, Al- snad and Al-Karamda) respectly was found to be valid and conforming to the specifications, with a value of between 687 - 1185 mg / L. The samples of areas 1.2 and 3 (Al-Shorfa, Al-Halifa and Oulad Hussein) respectly, are not identical to the specifications. As for the major elements such as sodium, potassium and sulfur when compared to their value in the specification, the samples of areas (4-5) (Alsnad and Al karamda) were found to comply with the specification. Samples of Regions No. 1,2,3 and 6 (Al-Shorfa, Al-Halifa, oulad Hussein and Al-Karamda) respectly, the evidence is not in accordance with the specifications applied in the study.

Keywords: Ground water; Salinity; Assessment

تقيم جودة المياه لبعض الابار الجوفية بمنطقة قصر الاخيار

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الملخص Abstract

في هذة الدراسة تم تقييم جودة مياه الابار لست مناطق بمنطقة قصر الاخيار وهي (الشرفة ، الحليفة ، اولاد حسين ، العماريين ، السند و الكرامدة) ومنطقة قصر الاخيار من المناطق الساحلية حيت تقع في الشمال الغربي لليبيا على خط طول 13.95درجة شرقاً وعلى دائرة عرض 32.7 درجة شمالاً. و تكمن مشكلة الدراسة على ان هناك قلة في المحاصيل المروية ذات الاهمية الاقتصادية للبلاد في منطقة الدراسة والسبب في ذلك هو ملوحة مياه الابار المستخدمة في الري كما وجدى اختفاء بعض أنواع الأشجار المثمرة في تلك المنطقة مثل الليمون، اللوزيات و الرمان سببه ايضاً ملوحة مياه الابار الناتجة من تداخل مياه البحر . وتهدف الدراسة الى معرفة نسبة تركيزالملوحة في ابار المياه السطحية والجوفية وتأثيرها على البيئة الزراعية والصحة العامة. ومن خلال النتائج المخبرية لعينات المياه بمناطق الداراسة الستة اتضح ان جميع المناطق المخصصة للدراسة تعتبر خالية تماماً من التلوث الميكروبي الناتج عن مياه الصرف بإستثناء منطقة الشرفة وجدا بها تلوث وهذا راجع الى وجود بعض الاسباب منها استخدام الاسمدة الحيوانية الطبيعية في المزارع بكثرة بالاضافة الى وجود بعض الابار السوداء بالقرب من مصادر المياه بمنطقة الدراسة وهذا الارجح. اما من الناحية الفيزيائية والكيميائية فوجدت نسبة الاملاح الكلية لعينات المناطق رقم (4-5-6) (العماريين ، السند و الكرامدة) على التوالي صالحة للاستعمال ومطابقة للمواصفات المعمزل بها، حيت تتراوح قيمتها ما بين687 – 1185 ملجرام / لتر فهي حسب الموصفة الليبية والمنظمة الصحة العالمية تعتبر صالحة لااستعمال في مجالات الحياة المختلفة حبت لم تتجاوز الحد الاقصى 1200 ملجرام / لتر .اما عينات المناطق رقم (1-2-3) (الشرفة ، الحليفة و اولاد حسين) على التوالي ، فانها غير مطابقة للمواصفات . اما من حيت العناصر الكبرى كالصوديوم ، البوتاسيوم ، الماغنيسيوم و الكبريت عند مقارنة قيمتهم بالمواصفة وجد ان عينات المناطق رقم (4-5) (السند و الكرامدة) مطابقين للمواصفة اما عينات المناطق رقم (1-2-3-6) (الشرفة ، الحليفة ، اولاد حسين و الكرامدة) على التوالي فان هذة االعينات غير مطابقة للموصفات المعمول بها في هذة الدراسة.

مفاتيح الكلمات: مياه جوفية : ملوحة : تقييم

1. Introduction

Libya is one of the countries in the world in terms of lack of water resources in the early fifties did not discover any natural resources of any kind as the rate of population growth is somewhat limited and despite the lack of water resources, especially in the desert areas, but the population was dependent on water rain raging And the presence of some underground wells, especially in the coastal areas, and these resources have barely met their needs and at least during the past 25 years, the population growth rate increased significantly, which led to increased need for water and the development and scientific growth and It is possible to dig many wells, especially in the coastal strip extending from the west of the country to the east, where about three quarters of the population is concentrated, but the lack of planning policy and legal controls to regulate and rationalize water consumption led to the depletion of these water resources. Large cities such as Tripoli, Benghazi, Al Komes and others, where the high population density and excessive consumption of water in other coastal areas such as the village of Garahpooli and the palace of Qasr Al-Ikhayyar, the rural character still prevails over these areas where the agricultural land and few factories and the lack of urban development The poor management of drainage and water consumption and the lack of supervision and law led to the beginning of the deviation of these areas in the current of water depletion, and this is especially evident in the northern sector of the areas near the groundwater from the sea water has started some residents complain of lack of water in the wells or lack of quality for drinking or for the use of the house or even for agriculture sometimes and the preference of God, who created water and make it all living thing, man does not live without water and the success of man and progress and happiness and prosperity of present and future depends on water in terms of quantity and quality and accessibility.

1.1. Study Problem

The problem of this study is that there is a lack of irrigated crops of economic quality in the study area. This is due to the salinity of the wells used for irrigation, and the disappearance of some fruit trees such as lemons, almonds and pomegranates in this area. The rezone is sea water intrusion

1. 2. Aim

The aim of this study is to know the salinity concentration in surface and groundwater wells and its impact on the agricultural environment and public health

1. 3. Subjective of Study

- Knowledge of some physical, chemical and microbiological properties of surface and groundwater wells in the region
- Identify the level of water level in the Qasr al-Ikhayyar area
    - Comparison of the results obtained in this purely local and international specification, such as the World Health Organization "WHO" for drinking water and the extent of matching.

2. Literature survey

- Some of the studies conducted in the Garahpooli area between 1998 and 1999, which were aimed at assessing the water situation in the region by estimating the rates of decline and current pumping quantities, showed that the current rates of decline are much lower than the expected drop rates in previous studies In the central and southern regions close to the study area, which is concentrated most of the wells Kekla reservoir and Al-Myosin and the north-eastern area of the same tank has been the current decline rates are higher than expected in the previous study in addition to the current pumping quantities compared to The amount of water that can be withdrawn according to the previous studies is very small for both the Kalka and Al-Myosin reservoirs. [1]

- A further study was conducted during the period from the beginning of the summer month in 1997 until the end of the spring month in 1998 in the area of Tajoura, about 20 km north of Tripoli between the longitudes 13.20^{o} degrees east and the latitudes 32.49^{o} degrees north, where the study included five sites, Some of the pollutants in the study area and water quality assessment in the chemical field. To accomplish this work, 36 samples of wells in the study area, 4 samples of swamp water and one sample of each of the treated water were examined from the purification plant at the Freedom Plant for raising cows and sea water. Electrophysiological conductivity (EC), total dissolved salts (TDS), hydrogen concentration (PH), positive dissolved ions (Mg, Ca, K and Na) and negative dissolved ions (NO3, SO4, HCO3, CO3 and CL) (TDS) to 4150 mg / L in the well located in the district of Libby, 3328 mg / L in the well located in the tannery area is not suitable for drinking chemically. [4]

3. Materials and Method

3. 1. Location of study

Six areas of study were identified in the area of Qasr al-Ikhayyar (Al-Shorfa, Al-Halifa, Oulad Hussein, Alammariyin, Al-Snad and Al-Karamda) and the Qasr Al-Ikhayyar area of the coastal areas. It is situated in the north-west of Libya at a length of 13.95^{o} degrees east and 32.7^{o} degrees north, (3.1). It is predominantly agricultural. It is confined between the mountain from the south and the sea from the north. This distance extends approximately 20 km. Agriculture is the main resource for the population. Its soil is considered to be the first silt texture. In some parts, But the Celtic textures are The surface of this area is coastal plains and mountainous slopes, and some of the valleys that are in the rainy season, and the depth of the water is about 30 m near the sea. This depth increases as we go south, about 140 m near the mountain and as a result of the decline of the natural area Towards the sea, the groundwater is flowing and leaking through the rock layers moving in the direction of the slope under the influence of gravity Earth is characterized by the rest of the Libyan coasts with winter rain, where the average rainfall is moderate, which ensures the natural revenue of ground water with as a result of this study, we are trying to highlight the status of water in this region in terms of its existence, quality and chemical suitability for human use. Such as drink, industry, agriculture and others.

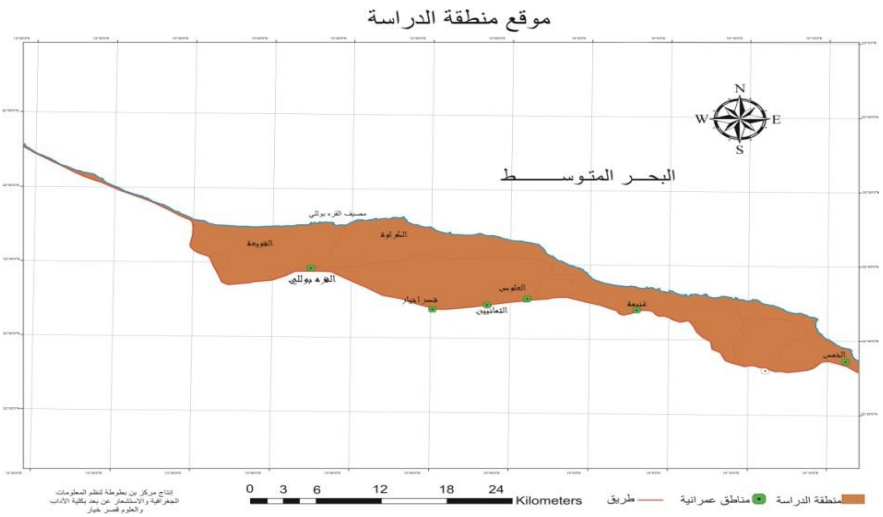

Figure (3. 1) shows the study area

3. 2. Zones study

1- Al-Shorfa: A population of about 400 people. The type of agricultural crops those are famous for their fruit trees. The trees are most abundant. The depth of the well is 106 m.

2 – Al Hlefa: population of about 200 people type of agricultural crops famous for vegetables and barley, fruit trees Olive, the depth of the well from the sample 145 m

3 - Oulad Hussein: population of about 1500 people, agriculture, which is famous for olives and lemon, and some vegetables, either the industrial activity has a factory Al ceramic, the depth of the well of the sample 130 m

4 – Alammariyin: The population of about 2500 people. Olive and lemon, and some seasonal crops such as barley, depth of the well of the sample 120 m

5 – Al Snad: the population of about 1500 people, the type of agriculture that is famous for olives, barley depth of the well of the sample 117 m

6 – Al karamda: a population of about 1000 people, agriculture is famous: olive, barley depth of the well of the sample 130 m.

Table (3. 1) shows the study areas and the number and depth of wells

Area name	Depth/ Meter	Number of wells	Have been Analysis	use of drinking	use for cultivation
North Coast					
Al-Shorfa	106	80	No	No	Yes
Al Hlefa	145	80	No	Yes	Yes
Oulad Hussein	130	60	No	No	Yes
Right Coast					
Alammariyin	120	70	analyzed	yes	yes
Al Snad	117	50	Not	Yes	Yes
Al karamda	130	80	analyzed	Yes	Yes

3.3. Method

The study was conducted between 2016 and 2017 on the area of Qasr Al-Akhayar and specifically on six areas by a systematic selection of the first theoretical study, using the information and previous studies and the second method of analytical field work, which was the examination and monitoring data to evaluate the water quality in the study areas by tracking the properties Physical and chemical comparison of the standard specifications by 18 samples during a period of three consecutive months for six areas in addition to conducting field and laboratory tests according to the standard methods, 1995 according to the approved methods and local standards Globally, the standard specification Libyan No. 82 for drinking water and specifications of the World Health Organization [6].

3. 4. Samples collection

Water samples for chemical and physical analysis were collected using plastic containers made of polyethylene (PE) polyethylene capacity of 1 liter.

Samples were taken from six locations and repeated three times for each source and using standard methods for the conservation, collection and analysis of samples. AWWA, 1995 immediately after sampling, data were written on them such as sample number, sampling date and sample source. In the case of specimens of microbial detection, During the period of the study, which lasted about three times, three samples of the study areas from the wells and field measurements such as pH and the degree of electrical conductivity and then transferred in samples of the laboratory to carry out the necessary analysis [2].

3. 5. Primary processing of samples

The filtration process was done immediately after taking to prevent the absorption of soluble elements by the suspended materials (less than 45 microns) using filter paper and keeping them at normal temperatures without freezing at about 4 ° C [3].

3. 6. Preservation operation of sample

Samples are kept in a folder at 4 ° C to prevent the evaporation or degradation of the components to be analyzed.

3. 7. Analysis and Measurement

Laboratory tests were carried out at the Central Laboratory for Water Analysis in Tripoli, the "Environment Laboratory" where physical, chemical, PH, EC, TDS, T0, Total (TH as $CaCO_3$) by the EDTA solution with 0.01N concentration and Ero-chrome Black T (EBT) and calcium (Ca) in the correct manner using the Monoxide solution and the use of the Monoxide solution Determination of Magnesium (Mg) depending on the concentration of each R. Overall (TH), calcium (Ca) measured either chloride (Cl) was a way Altzhih using a standard solution of silver nitrate ($AgNo_3$) concentration 0.014N guide potassium dichromate (Di chromate potassium) [2].

And measuring both sulfates and turbidity using the Turbidity Meter, HACH 2100 US-made

The determination of both Na (Na) and K (K) with the Flame Photometer, Janway-PFP7 is made in Britain. The degree of electrical conductivity and the ratio of soluble salt [5,7].

The total temperature and temperature were estimated in the MP-6PHACH Company and the PH is estimated by the PH meter as American.

4. Results and Discussion

4. 1. Results

Physical and microbiological results

Table (4. 1) Results of physical and microbiological analyzes of wells in the study areas

Area Name	Origin	Physical Properties				Microbial Analysis
	Well depth m	**EC** µs/cm	**T.D.S mg/L**	**PH**	**Turbidity**	
1 Alshorfa	106	2208	1185	7.85	20	Heavy pollution
2 Al Khalife	145	2175	1167	7.69	5.0	Nil
3 Oulad Hussein	130	1921	992	7.92	22	Nil
4 Alammariyin	120	1348	712	8.01	4.0	Nil
5 Snad	117	1303	687	7.99	4.0	Tow colonies
6 Alkaramda	130	1584	841	7.87	5.0	One colony
STANDRAD	-	2500	1000	6.5 - 8	5.0	3 colonies

Chemical results

Table (4. 2) shows the results of chemical analysis of samples of well water in the study areas

Chemical properties Mg / L	**Al Shorfa 1**	**Al Halefa 2**	**Hussein sons 3**	**Alamarin 4**	**Al Saned 5**	**Al kramed 6**	**STANDRAD**
TH	730	690	560	360	380	440	200-500
Ca^{+2}	240	212.4	68.6	60	60	76	75-200
Mg^{+2}	117.6	114.6	117.9	72	76.8	87.3	30-150
HCO_3^-	414.8	439.2	378.2	280.6	292.8	366	100-200
CL^-	404	375.7	343.8	265.8	248	280	200-250
Na	152	152	138	91	91	124	20-200
K	8.1	9.0	5.1	3.7	3.0	3.7	10-40
SO_4^{-2}	340	364	280	90	97	180	200-400

4. 2. Discussion

Electro conductivity (EC) is one of the most important indicators and indicators of water salinity and measured in micrometers / cm. They are still within the limits allowed by the specification.

The total soluble salt (TDS) is based on solubility of salts by the degree of electrical conductivity measured in mg / L and the permissible limit according to WHO (World Health Organization) is 1000 mg / L and according to the Libyan standard 1200 mg (687-1185 mg / L), according to the Libyan Standard and the World Health Organization .

The PH value is based on the measurement of the regulated solutions and found a value ranging between (8.01 - 7.69) When compared with the applicable specifications (6.5 - 8.3), they are within the permissible range.

Total hardness (TH) was measured using a standard sodium hydroxide (EDTA) solution, a compound with 0.01N calcium and magnesium concentration. The guide used in this calibration is a regulated solution (pH 10) and a 0.01X calcium aerosol guide. Calcium and Magnesium

[2, 6]. When estimating and calculating the results, the value of each of the area samples (4-5-6) according to table (2.4) was found to be valid and in accordance with the specifications. The wells samples for the three regions (1-2-3) are not in conformity with the applicable specifications. The minimum standard is 500 mg / l

Calcium (Ca) Calcium The same standard solution (EDTA) was used with the same previous concentration of 0.01N with the use of one drop of NaOH and MORXID (or ammonium sulfate). Based on the analysis, it was evaluated in Al-Shorfa, 212 mg / l) respectively, while the rest ranged between 60-76 mg / L.

Magnesium (Mg) Magnesium is calculated by the mathematical equation (Eq 4.1) and by knowing the value of calcium and total hardness.

$$\boldsymbol{Mg}\ mg/L = \boldsymbol{TH - Ca \times 0.24} \qquad \textbf{Eq (4. 1)}$$

Bicarbonates (HCO_3) Bicarbonates A standard solution of $H2SO_4$ was used, with a concentration of 0.02N and a drop of Methyl Orange (MO). After analysis and estimation, the samples of Regions (5-4) were found to be valid and conform to the specifications. (1-2-3-6), these samples do not conform to the specifications.

Chloride The Mohr Method was used to precipitate and use a 0.01N silver nitrate solution plus a drop of the Potassium Chromate Directory. Upon calculation, the samples of Regions (4-5-6) were found to be usable and conform to the specimen. No (1-2-3) is not compatible with the specification.

Sodium(Na) and Potassium (K) were measured by Flame _ Photometer (PFP7) - Jan May. When comparing their results, they were found to be identical to the specification.

Sulphates (SO_4) were measured using the Turbidity Meter (HACH2100) [4]. When comparing the results, the samples of Regions (4-5-6) were found to be suitable for use and conform to the specifications. The samples of Regions (1-2-3) are not identical to the specifications.

Turbidity (Tur) Turbidity was estimated with the same Sulphates device. The results of the samples of regions (2-4-5-6) were found to be valid and conform to the specifications. The samples of regions (1-3) are not identical to the specification.

In terms of microbiological analysis, the collection of samples of the study areas was free and completely free from microbial contamination, except for the samples of the terrace area, where pollution was found at a very high level. The study is more likely.

5. Conclusion

Through the laboratory results of water samples in the six study areas in the area of Qasr al-Akhayar it became clear to us:

All the study areas are considered to be almost empty or completely free of geranium pollution except for the terrace area. This is due to the presence of some of the reasons for

the use of natural animal fertilizers on farms and in abundance, in addition to the presence of some black wells near the water sources in the study area.

In terms of physical and chemical, the percentage of total salts was between 687 - 1185 mg / L, according to the Libyan specification 1000 mg / l and the World Health Organization 1200 mg / l is considered valid for use.

The samples of areas (4-5-6) are suitable for use and conform to the specifications. The sample (1-2-3) is not identical to the specifications. Potassium sodium when comparing their results was found to be identical to the specifications. The Sulphates found that the samples of areas (4-5-6) are suitable for use and conform to the specifications. The samples of areas (1-2-3) are not identical to the specifications. The samples of Regions (5 - 4) are valid and conform to the specifications. As for the samples of areas (1-2-3-6), these samples do not conform to the specifications.

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