ISBN-978-989-9121-29-4
35th ISTANBUL International Conference on "Chemical, Agriculture, Biological and Environmental Sciences" (ICABE-23)
Sept. 5-7, 2023 Istanbul (Turkiye)

Evaluation of The Chemical Characteristics with Time in Marine Wells in Kuwait

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Abstract: *Nabkha is a geomorphology phenomenon that represents accumulations of sand by the wind around the plant and spread in the north of Kuwait Bay and in the coastal part of the Sabah Al-Ahmad Natural Resort in Jal -alzour. Nabkha is the largest coastal plant in Kuwait around Nitraria Retusa has been observed that these plants vary in their ability to grow and live in the Sabkha area. Two wells were drilled on the top of the group of Nabkha, and the second was at the level of Sabkha through a scientific project earlier. these well were monitored and analysed for PH and the total dissolved solids (TDS). The aim of this study was to evaluate the characteristics of acidity and chemical characteristics with the time of water samples in wells. The analysis of two wells, Sabkha and Nabkha, in northern Kuwait Bay were compared with the results of studies that have taken place around the plant in the years from 2005 to 2007. The study concludes there is variation in total dissolved solids in the Nabkha and Sabkha wells due to the nature of the plant (Nitraria retusa), which increases the lens underground to collect the water during the flood and rain seasons to use it during the drought period.*

Keywords: *Phenomenon, Kuwait, Chemical*

1. Introduction

Since more than four centuries before Islam the Nabkha (Arabic word) used to denoting the dunes surrounding desert plants. The word Nabkha is used in Arabic Literature before lot of centuries ago. In Kuwait Nabkha differ significantly in size and shape. Costal Nabkha are developed around several plant species in the northern and southern coastal of Kuwait. Dunes associated with plants are very common indeed because there is a considerable scattering of bushes or clumps of grass in many. Similar dunes grow on sandy beaches in various climates. This kind of dune was described from an early date (review in Hesp 2000).They are dispersed in local hollows at the extreme southeastern strip of the country. These hollows are covered by salt flats where Sabkha flat sediment (Al-Qazali2000). The vegetation of Kuwait has agonized exhaustive decline of rangeland output and it is therefore likely that many vegetation mounts are leftovers of wetter along old water channels or around moisture retentive basins, as the sand accumulated the plants improve progressively root systems to reach groundwater available in the mound. The vegetation will die if the mound accumulates more than the ability of the plants to reach the water. The distribution of Nabkha depends on the conditions for the mean plants species, with water and nutrients the aeolian sand

surrounds their Nabkha guards and feed the plant. This study aimed to Identify and evaluates the changes in ground water quality (the acidity and chemical properties with time) beneath Nabkha and Sabkha of Kazma Northern Kuwait Bay. (Sabkha in coastal area and Nabkha in desert) at Kazma northern Kuwait bay and compare their results with previous results done by Al-Dousari eta, 2008 monitored ground water in two drilled wells in the sabkha and in nabkha within Khazma area for 12 Months. They found a tremendoius variation in total dissolved solids between the wells. The activities involved sampling of existing ground water wells under Napkha and Sabkha and laboratory analysis .The results were compared with historical records for chronological evaluation.

2. Methodology

Sample Collection:

6 ground water samples were collected from two wells in Sabkha and Nabkha along the Costal habital of Jal Al-Zour National resort, Kuwait and transferred carefully to the lab for analysis.

Sample Analysis:

PH Measurements:

The PH value was measured by PH meter ORION 5 STAR THERMO SCIENTIFIC

Electric Conductivity meter:

For measuring the Conductivity the Electric conductivity meter EDT Microprocessor

RE 387 was used to check the Conductivity and the Calibration solution 1413 µS/cm at 25 º C was used for calibration.

Total Dissolved Solids at 180ºC by Gravimetric Method:

The salts were calculated as total dissolved solids (T.D.S.) by applying standard test method AWWA 2540C by evaporating the water at 180C by using water bath and air oven.The solids were measured by calculating the salts residue gravimetrically.

Calculation of the amount of Total Dissolved solids as follows:

$$\text{Total Dissolved solids (TDS), in mg/L} = \frac{(A - B) \times 1000}{\text{Filtered sample volume in ml}}$$

Where:

A= Weight of dried residue + dish, mg, and

B= Weight of dish, mg, (AWWA 2540 C)

3. Result and Discussion

6 samples were collected in period 3 months for two wells Nabkha well and Sabkha well for Nitraria retusa plant in Jal AlZour National Park Kuwait. The samples were duplicated for quality control and quality assurance .The results shown as following (Table No.1) Where MD-1 represent the Sabkha well and M D-2 represent the Nabkha well. :

TABLE I:

No.	Sample No.	pH	E.C. µm/cm	TDS ppm By meter	Reading 1	Reading 2	Mean TDS at 180º C ppm
1	MD-1	7.45	14280	9520	10021	9804	9912
2	MD-2	7.11	2936	1956	2154	2171	2162
3	MD-1	7.32	13600	9080	9051	9902	9476
4	MD-2	7.16	4212	2804	2897	3026	2961
5	MD-1	8.13	13510	9010	10225	10365	10295
6	MD-2	7.98	10850	7230	7822	7932	7877

Fig.No. 1 shows the differences in pH values between the two existing wells in different time period as it show there are slight differences between them in Jun. and Aug. while in Dec. the pH found slightly increase may because of the acidic rain where it comes from the power station around the study area. Also in sabkha well the pH found more than Nabkha well.

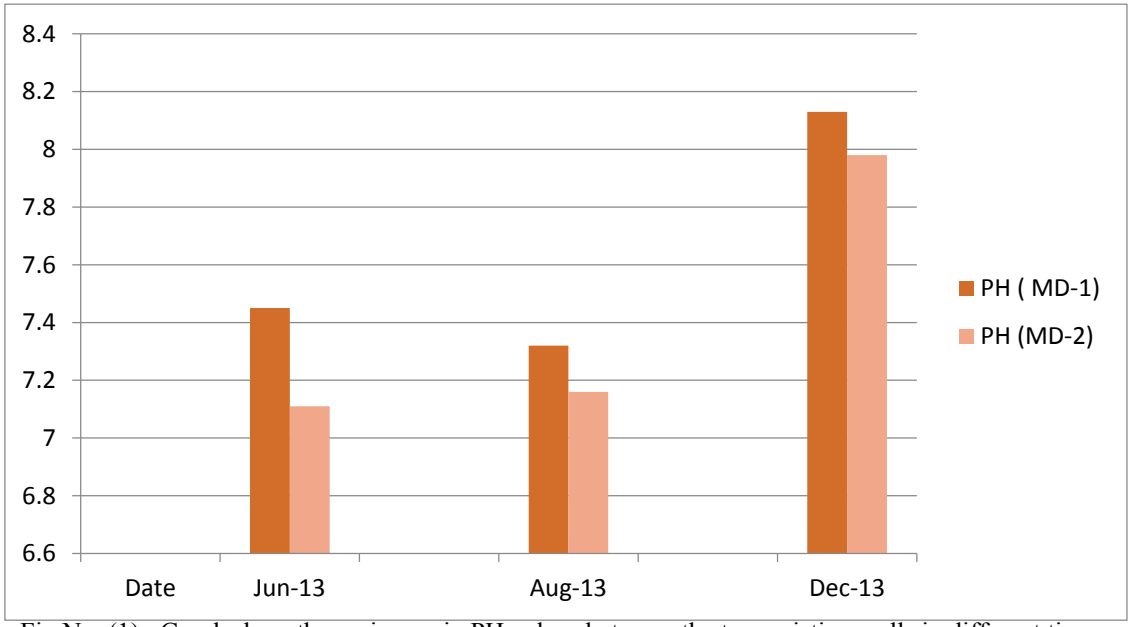

Fig.No. (1) : Graph show the variances in PH values between the two existing wells in different time period

Fig.2 shows the differences in conductivity values between the two existing wells in different time period as fig.No.4 shows there is tremendous differences between them in period of study. At the Sabkha Nabkha well the conductivity found too high obviously due to its neighboring the shore.

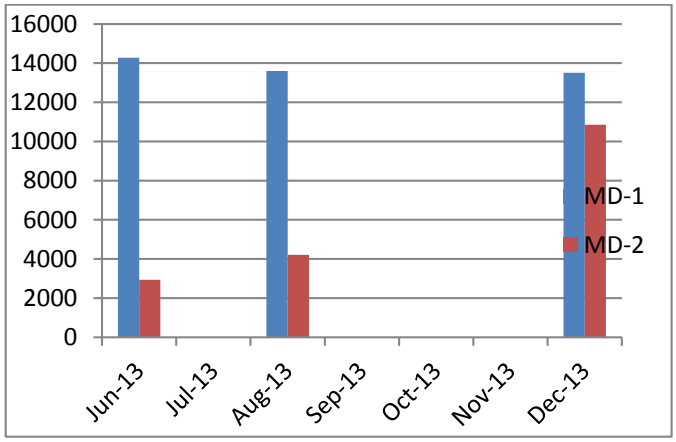

Fig. No. (2) : Graph shows the differences in conductivity values between water samples from two existing wells in different time period

TABLE II: Depth to Groundwater from casing in m.

Date		
	MD-01	**MD-02**
Dec-05	2.03	1.88
Jan-06	1.87	1.69
Feb-06	1.76	1.56
Jun-06	1.86	1.70
Jul-06	1.90	1.75
Aug-06	1.93	1.77
Oct-06	1.98	1.85
Nov-06	2.00	1.84
Dec-06	1.98	1.84
Feb-07	1.77	1.57
Dec-13	1.82	2.10

Table No.2 displays the depth to the ground water from casing in meters at different study years ago and this study taking in consideration that Nabkha is higher topographically than the Sabkha

The next two tables (Table No.3 and No.4) show the variation in Total dissolved solids mg/l between previous study done in different years ago and this study at the two existing wells. As show in the first table the T.D.S. was high in Dec.-2005 in the beginning (11320 mg/l) then slightly decreases till (8930 mg/l) at Jul-2006 and slowly starts increase till it becomes (10295mg/l) in Dec.-2013.(see Fig No.3).

TABLE III: Groundwater Quality for Well MD-01 in mg/l (well in Sabkha Nabkha)

Date	**MD-01**
Dec-05	11320
Jan-06	11340
Feb-06	11080
Jun-06	10880
Jul-06	8930
Aug-06	9497
Oct-06	9671
Nov-06	9460
Dec-06	9633
Feb-07	9418
Jun-13	9912
Aug-13	9476
Dec.-13	10295

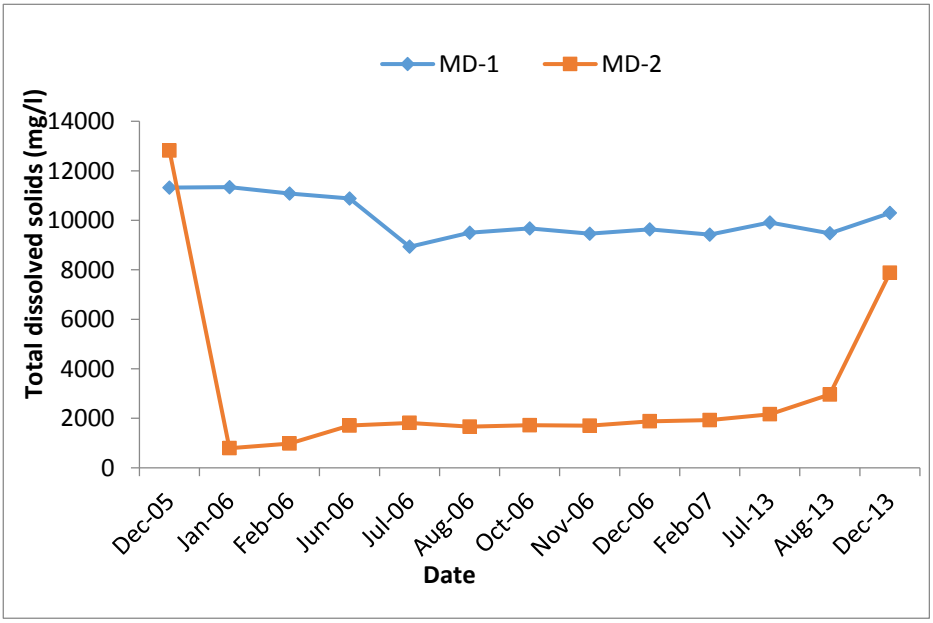

Fig. (3): Graph shows the differences in the total dissolved solids values between the two existing wells in different time period

The Relation between rainfall and the fluctuations in Total Dissolved Solids:

The next table (Table No.5) and graph illustrate the amount of rainfall in milliliter in between 2005-2007 .It was clear there is relation between the rainfall amount and the fluctuation in the total dissolved solids values. In Dec. 2005 the amount of rainfall was 51.3 ml (See Fig. 4) and the T.D.S. was high (11320 mg/l) While in Jan.2006 the amount was 26.5ml and the T.D.S. was only (790 mg/l) and these results may retains to when the rains fall in amounts it reacts with the salts around Nabkha and with gravel which increase the total dissolved solids.

Table V

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2005	**59.3**	**14.8**	**29.9**	**1.7**							**30.6**	**51.3**
2006	**26.5**	**20.2**	**0.2**	**14.8**						**0.6**	**4.9**	**47.7**
2007	**27.3**	**6.6**	**18.2**	**8.9**								

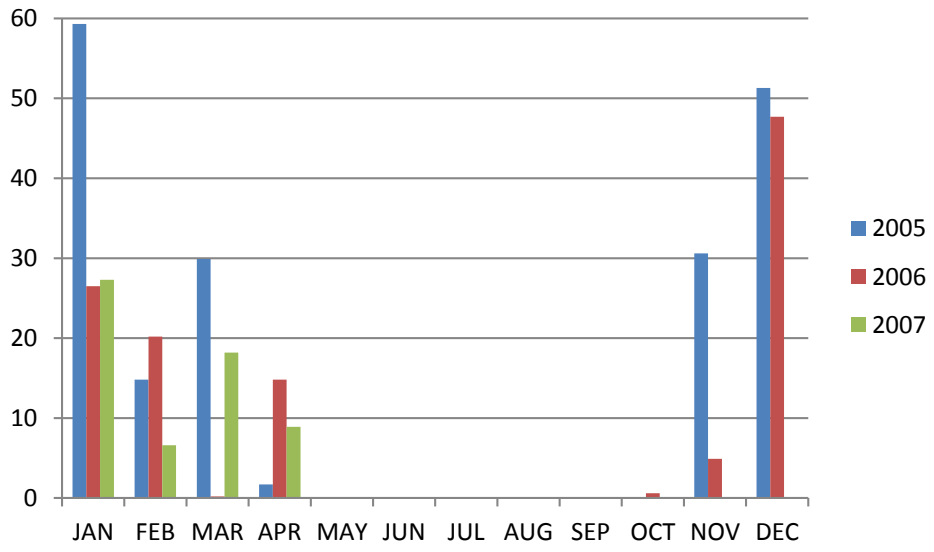

Fig. (4): Graph illustrates the rainfall amount in milliliters in earlier studies

4. Conclusion

The study conclude there is variation in total dissolved solids in the Nabkha and Sabkha wells due to the nature of the plant (Nitraria retusa) which is increase the lens underground to collect the water during the flood and rain seasons to use it during the dryness or drought period. Also we noticed in the field a kind of zonation between dried or dead Nitraria sp. In addition, flourished plant with a transition zone in between.

5. References

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