

Research Article

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A Study Some Physical and Chemical Properties of Khuweisah Valley Basin East Of Misaan Governorate by Using Rs&Gis

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ABSTRACT

The study dealt with some physical and chemical properties of khuweisah I order to Clearfy and highlight contrast in those properties between two seasons, summer who represented by (July) and who represented by winter (January). Also high light contrast on differences among the sites during the same season for the period from (1987–2018). Three samples were chosen for each season in order to explain the differences. By analyzing the results of the properties temperature values are gradually increasing during the summer season due to atmospheric and solar radiation effects. Also showed the results that the values of turbidity had increased during summer season due to total suspended materials in the water. The dissolved oxygen concentrations in summer season were high due to increased concentrations of salts in this season, value of (PH) more salty in summer season, moderate during winter. Concentrations of other elements were variable among sites in the same season.

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Received: February 05, 2020; **Accepted:** February 13, 2019; **Published:** February 29, 2020

Introduction

Physical and chemical properties are regarded an important factor in determining the validity and quality of water which give indications for use on the content of the water from organic and non-organic elements and compounds. Temperatures affect chemical interactions in the soil. Also affect the solubility of gases in them. By analyzing the samples we noticed differences in results between both summer (July) and winter (January) seasons and the reason behind that is the increasing hours of solar radiation, evaporation and lack of downfall in summer, besides lack of water drainage of the valley and the water which existed came originally from winter raining in which exposed to evaporation along summer season in the area. Accordingly we found differences in physical and chemical properties, amount of dissolved salts very high on the contrary in winter season (January) which characterized by heavy rain, flood coming from eastern highlands caused increasing water drainage in the valley accompanied with reduction in temperature and rate of evaporation. We will discuss physical and chemical properties in details in this study.

Problem of the Research

Problem of the research could be explained via the following questions:-

1. What are the physical and chemical properties of the surface water in khuweisah valley basin?
2. Is there a variance in physical and chemical property values of the surface water in khuweisah valley basin?

Hypothesis of the Research

The research has put a hypothesis to Treatment the problem of

the research and achieve its objectives represented by the main hypothesis as in the following:-

“Physical and chemical properties values of the surface water in khuweisah valley basin differ according to the seasons. Also these values differ even in the same season among selected sites.”

Objective of the Research

This research mainly aims to uncover Physical and chemical properties values of the water in khuweisah valley basin. In order to highlight the differences in the values of these properties between seasons and during the single season according to selected sites.

Limits of Research Area

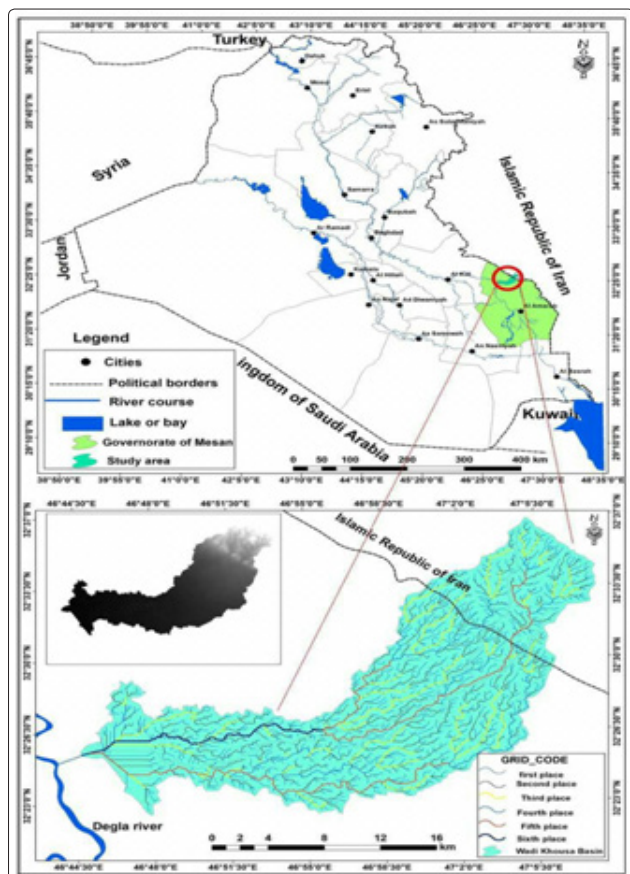
Khuweisah valley basin located with Ali Al-Gharbi district in Maysan governorate between both latitude to the north ($32^{\circ}23'$, $32^{\circ}33'$) and both longitude to the east ($46^{\circ}44'30''$ – $47^{\circ}5'0''$) (see the map No.1), is bordered to the north by the Ajlat area, from east by Iran, from the north by Alteeb river while from west bordered by Tigris river. As is clear in the figure no. (1), the valley basin showed in winter season, second figure showed the basin in summer season.

Physical Properties of Surface Water

Temperature (T): Water temperature differs from month to another and from season to another due to differences of the temperature of the air touching it and solar absorption and wind movement, besides water density. Temperature of the water of the study area was measured by taking samples directly by graduated mercury thermometer (0-100°C) in the water for (15 Minutes)[1]. The temperature in summer season of the three samples (31, 2, 30,

9, 31,4)°C respectively. This increase was due to raising in surrounding air temperature,while the temperature of the water in winter season was (13, 6, 14,0,13 &4) respectively because of reduction of the temperature in winter which leads to reduction of temperature in the water. (See the table No.1).

Map No 1: The Boundaries of the Study Area



The source of the researcher's work based on Iraq's administrative map 1:1000000 and the digital elevation data DEM

Table 1: Surface Water Temperature in the Study Area

Sample	Season	Temperature
1	July	31.2
2		30.9
3		31.4
1-1	January	13.6
2-2		14.0
3-3		13.4

The source of the work is the researcher, depending on the table

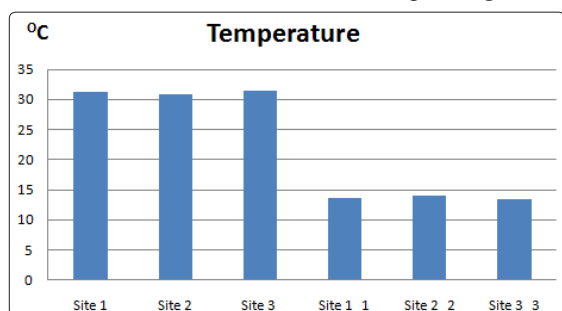


Figure 1: Values Water Temperature in the Study Area



The Valley in the summer season



Figure 2: The Valley in the winter season

The Turbidity (NTU): It is called alsomuddinessdue to total suspended materials in the water because the characteristics of pure water is transparency, but because of the existence of suspended materials within the water as in mud and silt and micro-organic materials the water became impure[2]. The values of impurity of the samples of water for summer season about (6, 10-2, 41-65,0) respectively. Meanwhile we noticed significant increase in turbidity value of sample 1because water contains a high proportion of suspended substances and clay. In winter season the results of sample analysis showed (18, 50, 15, 0, 28, 0) (see table No.2). The main reason is that the water in the area is from rain and flood that contains mud, silt and suspended substances.

Table 2: The Turbidity values of Water samples for both Summer and Winter Seasons

Sample	Season	NTU
1	July	65.0
2		2.41
3		6.10
1-1	January	28.0
2-2		15.0
3-3		18.50

The source of the work is the researcher, depending on the table

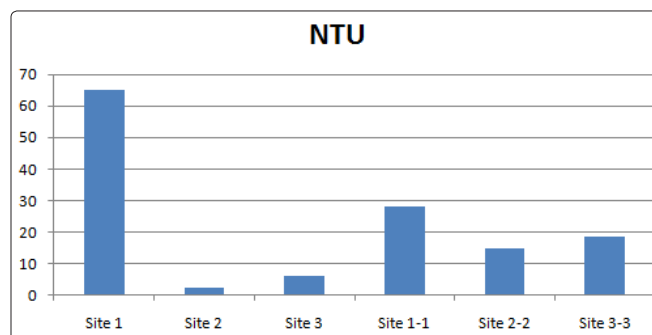


Figure 3: Values (NTU)

Total Suspended Solids (TSS): Are suspended materials, not soluble in water and its density is less than water density, including organic and non-organic materials (mud, silt, sand plant and animal materials) It was regarded fundamental physical indications to identify the quality of the water. There is close relation between TSS and turbidity. The greater the concentration of total suspended solids in water, the greater the turbidity and vice versa[3]. The results of the analysis for summer in three sites (30, 5, 0.53, 5, 71Mg/L). We noticed increasing in site No.1 which means that the existence of suspended materials more in other sites. The results of analysis in winter season showed (14,50,5,25, 8,65Mg/L) (see table No. 3).

Table 3: The Total Suspended Solids values of Water samples for both Summer and Winter Seasons

Sample	Season	TSS ml/L
1	July	30.5
2		0.53
3		5.71
1-1	January	14.50
2-2		5.25
3-3		8.56

The source of the work is the researcher, depending on the table

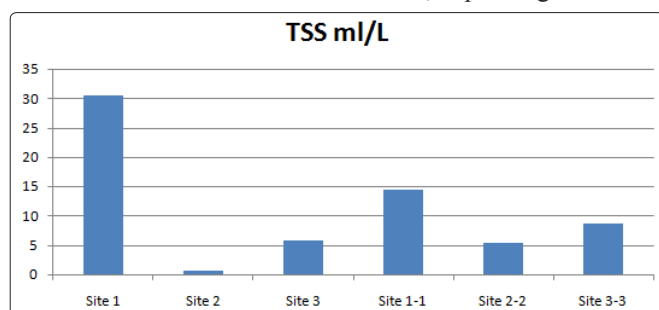


Figure 4: Values (T.S.S)

Chemical Properties of Surface Water

The quality of water reflects its chemical composition resulted from dissolution of several elements, gases and atmosphere suspends, besides effects of human being, water variation in chemical composition from one area to another and from season to another one, where water reacts with the soil of the area leading to dissolution and decomposition of rocks (carbonic and silicate rocks), also water expose to evaporation during raising of temperature and increasing of evaporation which leads to increasing in salt concentration and its ions. Accordingly the study of physical and chemical properties of the water and its variables had great importance to evaluate water resources in any area[4]. Chemical elements were measured (Do, TDS, E. C. PH) directly in the site by with (Oyster) device.

Dissolved Oxygen (DO)

Clean water is characterized by high concentrations of dissolved oxygen, while contaminated water characterized with low concentration of oxygen. Raising of temperature and increasing of evaporation which leads to increase in salt concentration in the water and eventually decrease in the value of dissolved oxygen. Dissolved oxygen was analyzed in the field directly by using dissolved oxygen analyzing device in the water because if the sample was taken from the field, it will not give accurate results. The results b for summer season showed (July) for the

three samples (1,26 - 7,50-3, 15 ml/L). We noticed that the value was the lower in site one due to increasing of salt concentration in this site, followed by site No. 3. Where as in winter season (January), the results were as follow (6,50 – 10,85 – 12,0ml/L). We noticed increase the rate in winter due to rainfall and reduction in temperature and evaporation rate which leads to decrease of salt concentration see table No. (4).

Table 4: The Dissolved Oxygen values of Water samples for both Summer and Winter Seasons

Sample	Season	DO ml/L
1	July	1.26
2		7.50
3		3.15
1-1	January	6.50
2-2		10.58
3-3		12.0

The source of the work is the researcher, depending on the table

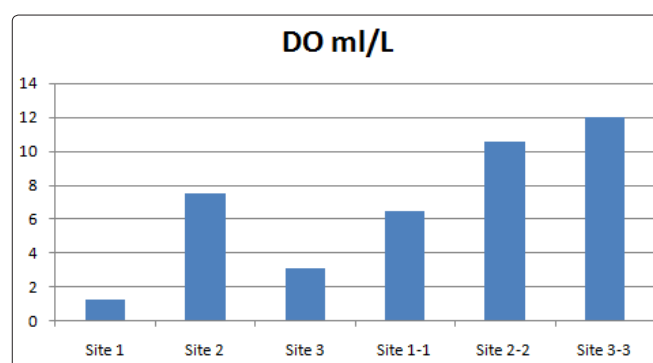


Figure 5: Values (D.O)

Total Dissolved Substances (TDS)

It is an expression of water salinity with the total dissolved salts (ionized and non-ionized), which are solid substances, does not include suspended materials, dissolved gases and slimy. Increasing in salts concentration will lead to increasing in electrical connection. Pure water has bad electrical connection. Total dissolved substances (TDS) is regarded as standard for dissolved mineral and organic substances in water[5]. Dissolved solid substances explained some quality properties of the water such as salinity which affect near to underground water levels from the surface to dissolve limestone rocks and the evaporators. Then the salt concentrations rise up to the surface through capillary property[6]. Total dissolved substances (TDS) was measured in the field in which the results of total dissolved substances values in the three samples for summer season (July) (144600, 32000, 26430 ml/L) respectively. The higher value was in both (1,3) sites respectively which means that the salt concentrations were very high in both sites, whereas low in the site (2). The reason refers to existence of water. By review table no. (6) Which showed water quality according to dissolved solid substances in it, we find that the great concentration salinity of the water was due to high temperatures and high degree of evaporation which the water stayed on the surface of the earth till evaporation leaving the salts. The results of winter season (January) were (1398, 240, 120 ml/L). This noticeable decrease in values is an indication of washing the soil from precipitated salts by rain water with great amounts in this season. Rain water is fresh water (see table and figure No. 5).

Table 5: The Total Dissolved Substances values of Water samples for both Summer and Winter Seasons

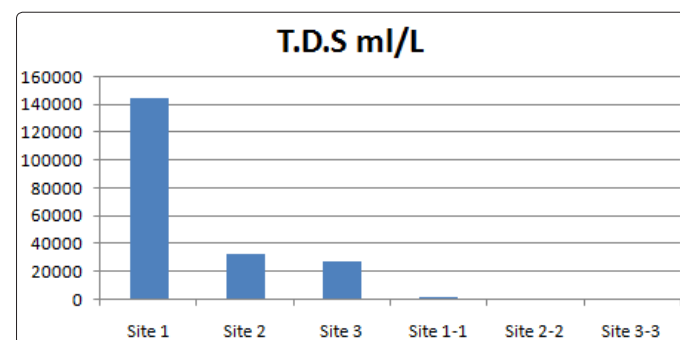
Sample	Season	TDS ml/L
1	July	144600
2		32000
3		26430
1-1	January	1398
2-2		240
3-3		120

The source of the work is the researcher, depending on the table

Table No 6: Water quality according to the amount of soluble solids

TDS ml/L	Water Class
1000-0	Fresh water
3000-1000	Slightly brakisk
5000-3000	Brakisk water
10000-5000	Saline water
50000-10000	Brine water

Davis, S.N. and Roger J. M. Dewiest (2011), Hyderogeology, John wiley& Sons, Inc. Printed U.S.A.



Potential Hydrogen (PH)

PH is defined as the negative logarithm of hydrogen ion effectiveness which is measurement of water salt acidity in ordinary circumstances of temperature and atmospheric pressure[1]. The value of pH ranges from (7-14). If PH value was (7<), the water will be alkaline (saline), but if the value was (7>) the water will be acidic. If the PH value was (7), the water will be equal (neutral)[2]. Balanced carbon dioxide (Co2) controls the value of bicarbonate and carbonate ions, where they work to balance PH changes. When PH is (8, 2<), the bicarbonate ions break down into carbonate ions, but if the value is (8, 2PH>), hydrogen ion will be added to carbonate ions to form bicarbonate ions[7]. The PH was measured directly in the field by special device. The results of water samples analysis showed in the three sites for summer season that the PH was (7,62 – 8,12 – 7,34) respectively. We noticed that the highest value was in site No. (2) Which indicates that the water is more salty in this site where as the results of winter analysis were (7,41 – 7,48 - 7,36) which indicates that the water is moderate salinity (see table No. 7).

Table 7: The Potential Hydrogen values of Water samples for both Summer and Winter Seasons

Sample	Season	PH
1	July	7.62
2		8.12
3		7.34
1-1	January	7.41
2-2		7.48
3-3		7.36

The source of the work is the researcher, depending on the table

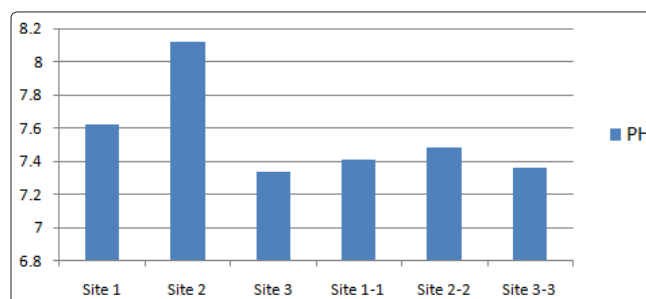


Figure 7: Values (PH)

Electrical Connection (EC)

Namely water viability on the electrical connection. This percentage increases with increasing salts and dissolved non-organic materials[8]. High temperature and increasing in evaporation rates will lead to increasing in salt percentages, eventually it has harmful and negative results on economic and agricultural aspects. In the same time leads to corrosion of metals if it contains sulphate salts or chloride[2]. Electrical connection was measured directly in the field. The results of dissolution of water samples for summer season were (241,0- 5,0 – 44,0 DM) respectively. We noticed great increase in the value in site (1) due to salt concentration more than other sites, whereas the results of winter season were (2,20, 0,380, 9,190 DM). We noticed great decrease in values and its differences in values and their differences with summer season due to rainfall and solid washing from concentrated salts in summer season (see table No. 8).

Table 8: The Electrical Connection values of Water samples for both Summer and Winter Seasons

Sample	Season	E.C D/M
1	July	241.0
2		5.0
3		44.0
1-1	January	2.20
2-2		0.380
3-3		0.190

The source of the work is the researcher, depending on the table

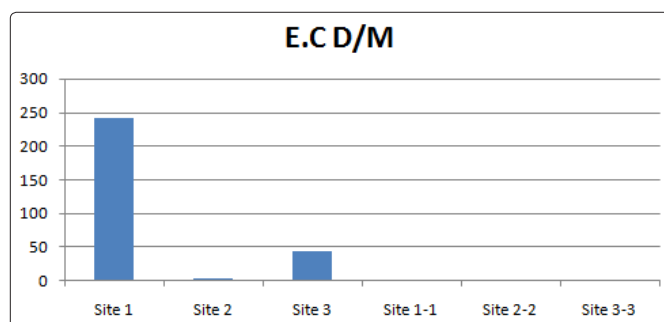


Figure 8: Values (E.C)

Alkaline (AIKI)

Alkaline is Composed because Existence the presence of carbonate, bicarbonate and hydroxide ions. They are of great importance in estimating acidity in water. Alkaline is regarded criteria for water capacity to equalize the acidity[9]. The results of alkaline of dissolution of water samples for summer season were (9450, 270, 1820 mg/L). The results of site one was very high because alkaline related to total dissolved substances (TDS) which is with very high concentration in this site and same thing in site three, whereas the results of winter season were (128, 24, 11mg/L) respectively. This explicit decrease in the values was due to rainfall, soil washing, high degree of relative humidity and low evaporation (see table No. 9).

Table 9: The Alkaline values of Water samples for both Summer and Winter Seasons

Sample	Season	AIKI ml/L
1	July	9450
2		270
3		1820
1-1	January	128
2-2		24
3-3		11

The source of the work is the researcher, depending on the table

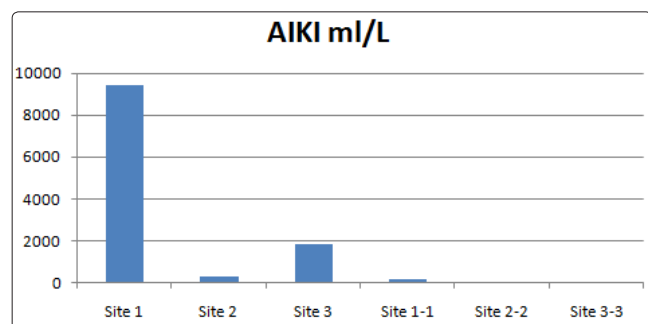


Figure 9: Values (AIKI)

Sodium Adsorption Ratio SAR

SAR measurement is used to know hydraulic conductivity of water which is one of important factors in identifying the quality of the water and an indicator to predict the severity of sodium and identify that the water contains sodium if sodium adsorption rate exceed (12) according to the US Salinity Laboratory[10]. The results of the analysis for the summer season (July) were (37, 05, 5, 74, 17, 30), the reason of this rising refers to the rising of sodium ion which is concentrated due to high temperatures and increasing of evaporation. Whereas the results of winter season

were (3, 75, 1, 76, 0, 82) respectively. This decrease is due to the fact that the rains are the process of washing the soil of salts which leads to reduction of the value of SAR (see table No. 10).

Table 10: The Sodium Adsorption Ratio values of Water samples for both Summer and Winter Seasons

Sample	Season	SAR
1	July	37.05
2		5.74
3		17.30
1-1	January	3.75
2-2		1.76
3-3		0.82

The source of the work is the researcher, depending on the table

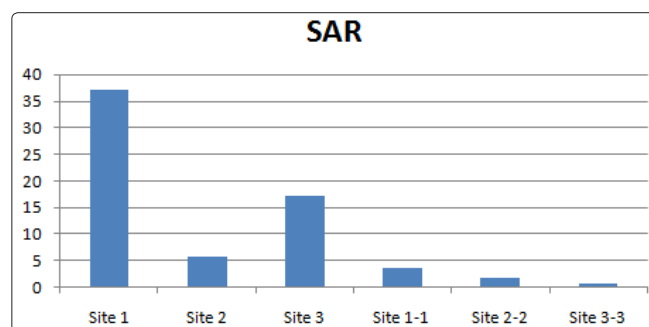


Figure 10: Values (SAR)

Conclusions

1. By analyzing chemical and physical properties of the water in Khuweisah valley basin we found differences in the values of these properties in terms of seasons and site values for one season.
2. The turbidity values of water samples for the summer season were (65, 0, 2, 41, 6, 10) respectively which showed explicit rising in turbidity value of sample one because the water contains suspended materials and mud. While the results of sample analysis in winter season were (28, 0, 15, 0, 18 & 50) and the reason for this is that the water in the area is rainwater and flood contains mud, silt and suspended substances.
3. The dissolved oxygen analysis results for the summer season for the three samples were (1, 26, 7, 50, 3, 15mg/L) which was less value in site one due to increasing in salt concentration in this site, followed by site three. Whereas the results of winter season were (6, 50, 10, 85, 12, 0mg/L). We noticed increasing rate in winter because of rainfalls and decrease in temperatures and evaporation rate which leads to decrease salt concentration.
4. The results of the analyzes of water samples in the three sites and for the summer season showed that the value of potential hydrogen PH was (7, 62, 8, 12, 7, 34) respectively. We noticed that the highest value was in site two which indicates that the water was more salty in this site while the results of winter season were (7, 41, 7, 48, 7, 36) which indicates that the water is moderate salinity during this season[11].

Recommendations

1. The need for the concerned authorities in the study area to take into consideration the benefit of the quantities of water available in the valley during the winter season which is rainwater could be used as water storage or for agricultural and industrial uses, besides, the valley exposed to large

quantities of floods annually coming from eastern highlands causing increase in water drainage in the valley.

2. Using modern techniques as remote sensing system and supporting systems, taking necessary procedures to make use of available water in winter season and water management and planning to benefit from the water for important projects.

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