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Effect of some Physiochemical characteristics upon on the presence of bacterial indicators in Al-Hussainia River waters

تاثير بعض الخصائص الفيزوكيميائية على وجود المؤشرات البكترية في مياه نهر الحسينية

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Abstract

The effects of some physiochemical properties on the number of bacterial indicators in Al-Hussainia river during the first six months of 2008.The samples were collected from four sites along the river from the Indian dam toward the province of Karbala. Bacterial indicators were calculated (APC) using the method of poure plate (Tc), (Fc), (Fs) using the M.P.N. method. The study of bacteriology indicators revealed the presence of aerobic total count was(50×10^2 - 480×10^2) cell, / 100 ml , total coliform bacteria was ($0\text{-}17 \times 10^2$) cell /100 ml , fecal coliform bacteria was ($0\text{-}10 \times 10^2$) cell / 100 ml while the fecal streptococci bacteria count was ($0\text{-} 20 \times 10^2$) cell / 100 ml respectively. The results was showed that the values of dissolved oxygen was ranged the (6-13) mg /l , while the temperatures value ranged the (8-21) c◦, and the pH values ranged between (7.2-8.6), the electrical conductivity ranging between the values (400 -1450micr / cm). While the water in the hardness, recorded the highest value in the month of February, at the fourth site 620 mg / L, calcium values were ranged (40-170) mg / L and magnesium ranged (20-150) mg / L.

المستخلص :

درس تاثير بعض الخصائص الفيزيائية والكيميائية على اعداد المؤشرات البكترية في نهر الحسينية خلال الستة الاشهر الاولى من عام 2008 . جمعت النماذج من أربعة مواقع على طول النهر بدءاً من سدة الهندية باتجاه محافظة كربلاء . تم حساب المؤشرات البكتيرية (A.P.C) باستعمال طريقة الصب بالإطباق و(Tc)، (Fc) ، (Fs) باستعمال طريقة M.P.N ، سجلت في هذه الدراسة أعداد بكتيرية (50×10^2-480×10^2) خلية/100 مل للعدد الكلي للبكتريا ،($0\text{-}17 \times 10^2$) خلية/100 مل لبكتريا القولون، ($0\text{-}10 \times 10^2$) خلية/100 مل لبكتريا القولون البرازي، ($0\text{-} 20 \times 10^2$) خلية/100 مل لبكتريا المسبحيات البرازية على التوالي . أظهرت النتائج في هذه الدراسة ان قيم الأوكسجين المذاب كانت بين (6-13) ملغم/ لتربينما تراوحت درجات الحرارة بين (8-21) م◦ ، وقيم الأس الهيدروجيني تراوحت بين (7.2-8.6) ، وقيم التوصيلية الكهربائية تتراوحت بين (400-1450) مايكروسيمنز/سم . بينما كانت المياه في هذه الدراسة عسرة حيث سجلت أعلى قيمة في شهر شباط في الموقع الرابع 620 ملغم/ لتر،اما قيم الكالسيوم فكانت بين (40-170) ملغم/لتر والمغنيسيوم بين(150- 20) ملغم / لتر .

Introduction

The problem of water pollution, whether the surface water or ground water, including primarily the result of the foundation practices and activities of humans are studied. As is known, the water is a part of the foundation of the body mass of each microbial pollution affects the quality of water and turn it into a polluted water used at the risk of causing serious and dangerous contaminants of water surface is sick microbiology, metals,chemicals(**1**).

Microbial pollutants that can move the water in the center is responsible for the occurrence of serious diseases and epidemiological moreover, an estimated billion -income people and how base is the average could not secure safe water for drinking and personal hygiene and household uses, and these figures represent about 20% of the world's population and approximately tow billion people do not have safe water(**2**) , and statistics show that in every eight seconds a child dies there is a result of contaminated water around the globe, about 50% of people in developed countries suffer from a disease or more of the diseases transmitted by water-mediated and about 80%of the disease in developed countries move through the water(**3**).

That the nature and quantity of chemical pollutants in the water a role in influencing the presence of the pathogenic microbial (**4**), as well as the physiochemical characteristics such as temperature,

pH , dissolved oxygen and total hardness may be help us assess the validity of the appointment of water for drinking (**5**).

Material and Methods

Sampling

Al-Hussainia river chosen the ramifications, which is one of the Euphrates River after the Indian dam to be in the study of samples collected in the first six months of 2008 from four sites along the river starting from the top of the first Indian dam site, the area Al-Hussainia (Zine El Abidine Mosque Imam the second site, Al-Attiyci area and the third site the Baghdad bab area, the fourth site, which lies about 300m from the province of Karbala. Collected bacteriological analysis of the models using sterile bottles with tight cover and a capacity of 100 ml bottles of the other group used for the purpose of testing the physical and chemical from the river after opening bottles of water within the depth of 10-30 cm from the surface of the water, it was a physical and chemical tests over a period of 24 hours The bacteriological tests have been carried out in 6 hours from the time of sampling (**6**).

Temperature was measured in situ using an ordinary mercury thermometer.

the electrical conductivity measured using of a type made by L17 Bischof of Germany and expressed the results micro / cm, and pH using the apparatus of the type of manufacture 1984 Company, (HANNA) and followed the method of altering the way Alazaid Winkler mentioned in (**7**) installed a stiu a dissolved oxygen concentration and the results expressed in units of mg / liter. Total hardness have been measured, the calcium and magnesium in accordance with (**7**). Calculated the total number of aerobic bacteria using the poure plate method coliform, faecal coliform and fecal streptococcus bacteria using the method M.P.N (**6**).

Results and discussion:

Recorded the highest density of aerobic bacteria in the month of March, the third site Figure (1) of 480×10^2 cell / 100 ml and less reading of 45×10^2 cell / 100 ml in the month of February, at the fourth site noted that the densities of bacteria growing at high temperatures and this is normal if the degrees temperature recorded in this study are suitable for the growth of bacteria and increase the numbers, and may explain the increased numbers of bacteria in the cold months, rainfall in excess of the proportion of surface water pollution, and in both cases, it may be due to the presence of organic materials lead to a doubling of their numbers bacteria issue on the analysis of these materials(**8**)and is responsible for these nutrients increase the growth of microorganisms in the water because they are good food sources of live microorganisms (**9**) and notes that the numbers bacteria in the third site was higher than the other of the sites due to the increase in agricultural activity on both sides of the river as well as the fluctuation levels of water in it. With regard to coliform and fecal coliform bacteria, coliform highest reading was 17×10^2 cell / 100 ml in the month of May at the fourth site Figure (2) and 10×10^2 cell / 100 ml in the month of April, at the third site Figure (3) in a row and the zero lower reading for the month of February, in the third site for coliform bacteria, and the second is for the fecal coliform bacteria, may be due to low temperatures and high numbers of these groups of indicators, it indicates the presence of pollutants stool up to the water from the adjoining land, this to confirm (**10**) and are sick of intestinal bacteria, including most species of bacteria from the coliform bacteria, endemic and exotic the aquatic environment are unable to adapt to environmental conditions and carrying (Physical and chemical) in the aquatic environment(**11**), recorded the highest reading of fecal streptococci in the month of April at the first site 20×10^2 cell / 100 ml and less reading of the zero and this means the non-arrival of the animal fecal contaminants, in particular, to the river. The presence some kinds of streptococcus in human fecal waste may be use as an indicator of fecal contamination and hence the existence of health risks in the water (**12**), and notes the high numbers of fecal streptococcus compared to the numbers of fecal coliform in the several months of study and this is due to the presence of old stool contamination and the

duration of survival of these bacteria longer than the survival of pathological intestinal bacteria (**13**).

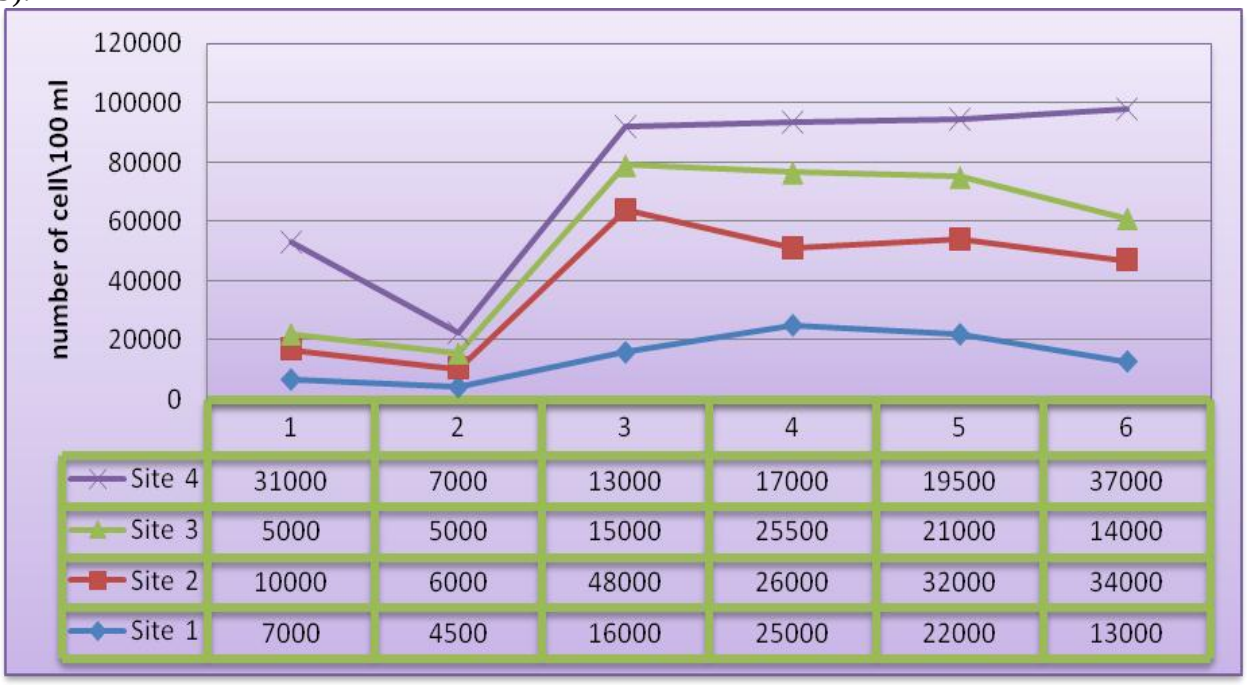

Figure (1): Number of Aerobic Plate Count\100 ml in the site for six months

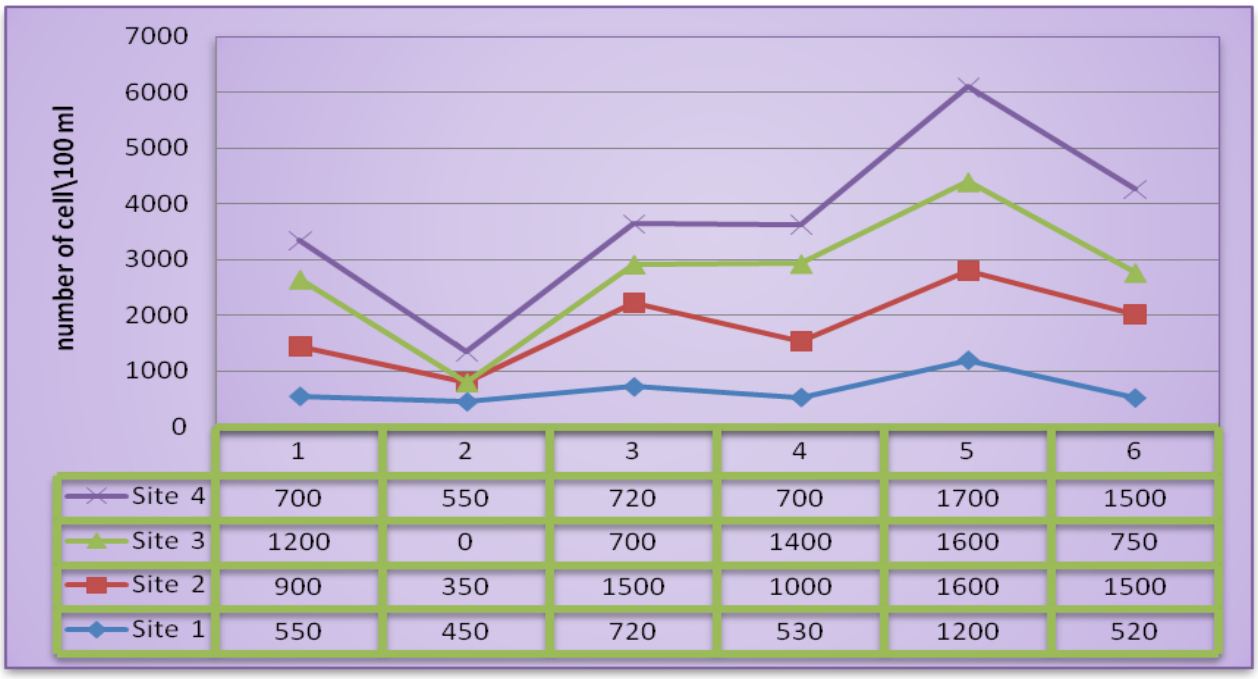

Figure (2): Number of total coliform bacteria\100 ml in the site for six months

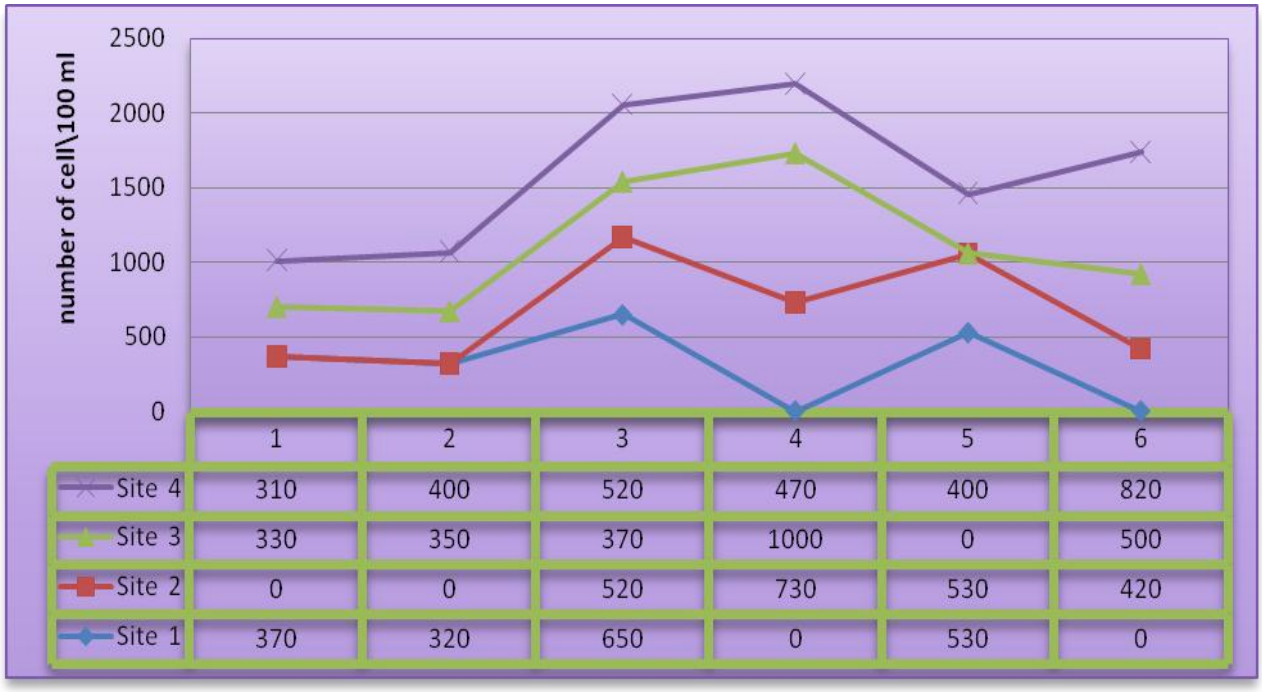

Figure (3): Number of fecal coliform bacteria\100 ml in the site for six months

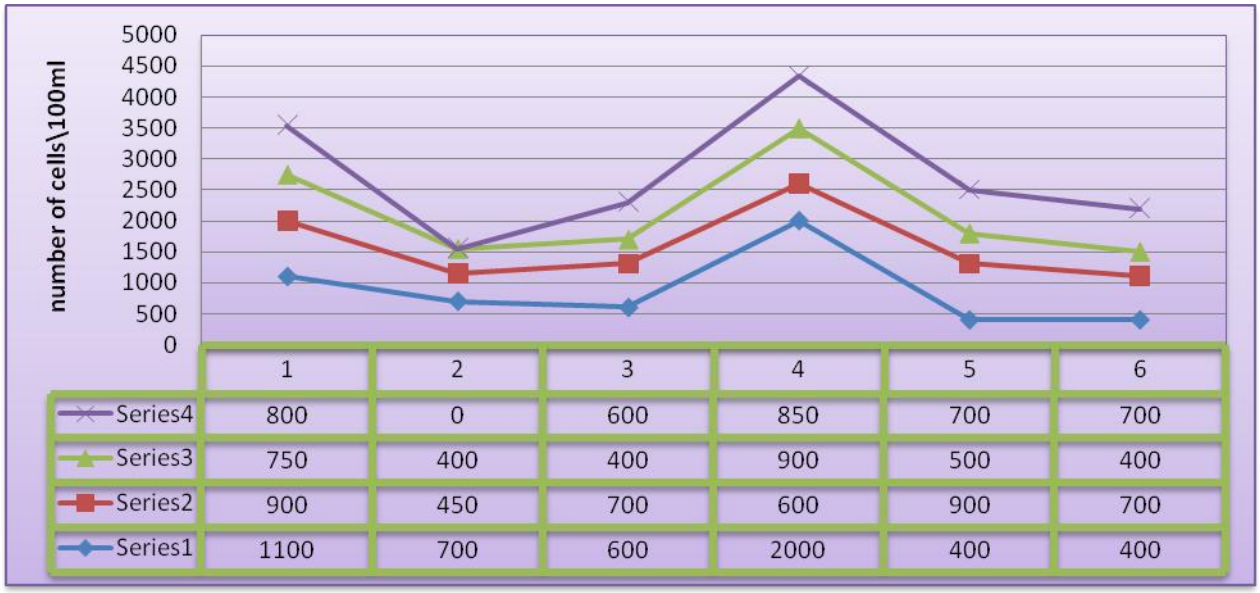

Figure (4): Number of fecal streptococci bacteria \100 ml in the site for six months

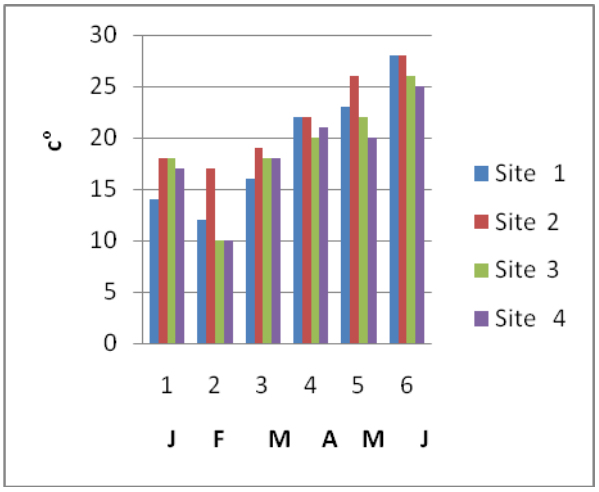

Figure (5):Temprture degree in the site of study for six months

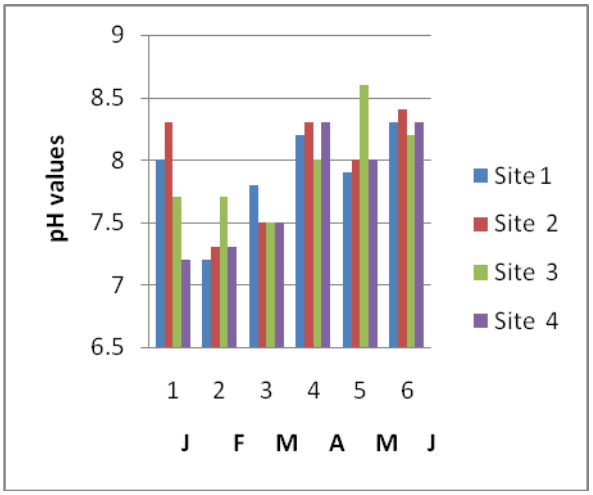

Figure (6):Values of pH in the site of study for six months

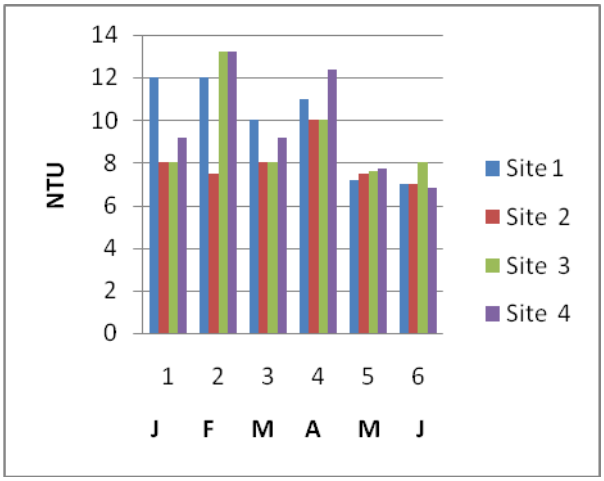

Figure (7):Turbidity values in the site of study for six months

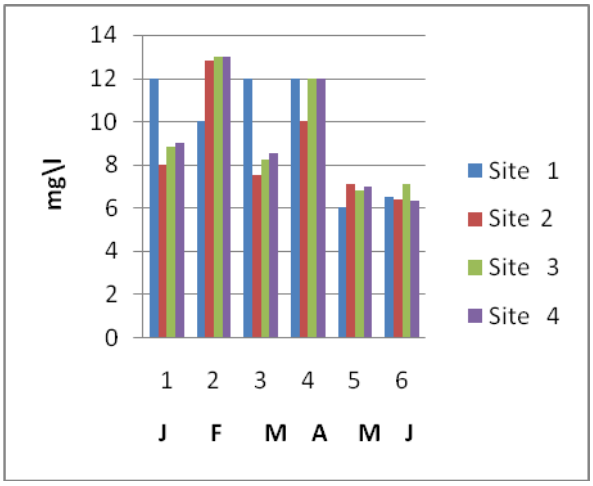

Figure (8):Dissolved oxygen values in the site of study for six months

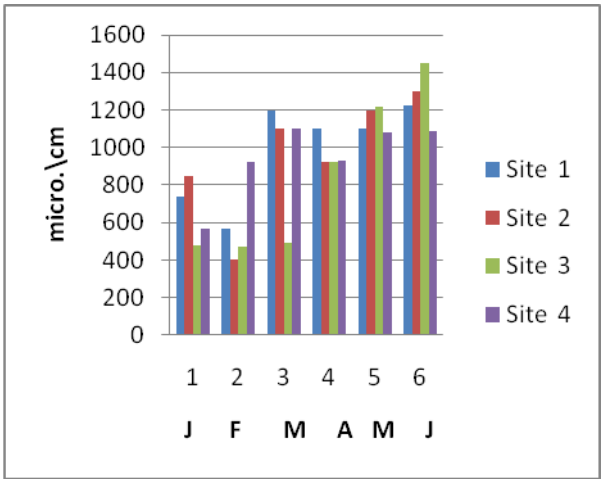

Figure (9):Electerical conductivity values in the site of study for six months

Figure (10):Calsium values in the site of study for six months

Figure (11):Magnasium values in the site of study for six months

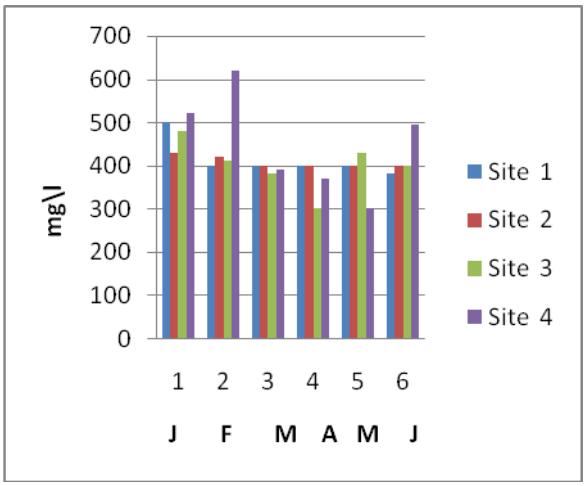

Figure (12):Total hardness values in the site of study for six months

J: January , F:February , M:March , A:April , M:May, J:June

Physiochemical characteristics

Temperatures ranged between (11-28) c◦as shown in Figure(5) and the fluctuation in temperature due to the difference in the times and the collection of samples. The pH values in this study ranged between (7.2-8.6) Figure (6) any water that tends to the grass roots and alkalinity light this is Iraqi waters. Figure (8), we find that the dissolved oxygen values ranged from (6-13) mg / l, may be attributed the cause of the high values of dissolved oxygen in most months of study to lower temperatures, as this will lead to increase soluble gases in the water (**14**) , where there is an inverse relationship between temperature and dissolved oxygen values**(15**). The decline in the values of dissolved oxygen at the fifth and sixth month of each site, it might start to explain the rise in temperature, or the presence industrial and agricultural pollutants in the water, this corresponds to the (**16**). Showed values of electrical conductivity is difference clearly where the values were lying in the first months of the study were 400 micr / cm in the month of February, the second site Figure (9) and the highest value recorded in the month of June and at the third site in 1450 micr / cm amounted to micro/ cm, was due to the process of washing and puncture the soil and rainfall that lead to the assimilation of salts and thus to increase the electrical conductivity values (**17**), recorded the highest value to the hardness in the month of February, the fourth site 620 mg / l, this means that this type of water is very brackish, and the reason is due to soil erosion around the water by rain or nearby low level of water that lead to high concentration in the brackish those waters (**18**). calcium values were higher than the values of magnesium, a common situation in Iraqi waters was due to the fact that the interaction of calcium with Co_2 gas bigger and stronger than its interaction with magnesium is therefore more than the amounts of calcium dissolved into a Bicarbonate (**19**), while the values of calcium were highest than values of magnesium in the third and fourth sites of February and all sites within the month of June may be due to erosion caused by the surrounding agricultural land (**20**).

Reference

1-**Lima,E.B., Gazineu,M.H.P., Paiva,S.C., Rego,R.C.P. and Salgueivo,A., (2003)**.Implemetacaodo indice de qualidade de ague para consme (IQAC),an area urbana do municipio de Rio formoso,P.E.Higiene Alimentar., 17;88-94.

2-**World Health Organization(2003)**.Water for development a practical advocacy guide for world water day.

3- **Parry,j.v., Mor, Timer., (1984).**The heat sensitivity of hepatitis A virus determined by simple tissue culture method.J.Med.Virol.,14:277-283.

4-**Dornlr,S., Huck,P., Slawson,R., and Andirson,W.,(2004).**Assessing level of pathogenic contamination in a heavily impacted river used as drinking water source .J. Toxical. .Environ.Helth., 67:1813-1822.

5-**Mathuthu,A.S., Zaranyika,M.,Tafirenyika,S., and Chibanda,B.,(1995)**.Impact assessment of sewage effluent discharges on the quality of the receiving lower Maknvisi river in Harari Zimbabwe. Environ. Sci.Health A30281-297.

6-**APHA, AWWA ,WPCF (1995)** .standard methods for Examination of water and waste water .American public Health Association ,Washington ,U.S.A. Science Publisher, Ann Arbor , MI.

7-**American public Health Association. (APHA). 1985**. Standard method for Examination water and wastewater, 16th. Ed. New York.

8-**Hambsch B., and Wener P.,(1993).**Control of bacterial regrowth in drinking water treatment plants and distribution system. Water Supply 11:299-308.

9-**Vander Kooji D., Veenendaa Hr., Bolc J.C., Dutan M., Mailar J., Reasone D.,and Sladeckova A.(1994).** Biofilm development on surface in drinking water distribution systems. In :Biological activity in distribution systems. Rev.J.Int./Water Supply. Ass. 12 : 1-17.

10- **Myrvik, Q. and Wesier, R. (1998)**. Fundamentals of medical bacteriology and Mycology. 3rd. ed. Lea and Fibiger, Philadelphia.

11-**McFeters G.A.,Lechevallier M.W., Singh ., and Kippin J.S., (1986)**.Health significance and occurrence injured bacteria in drinking water. Water Sci.Technol.18:227-231.

12-**Cabelli, V.J ; A.p.Duour ;M.A.lev, and L.J.Meca(1982)** .Swimming-associated gastroenteritis and water quality .Am.J. .Epidemiology . 115.606-61.

13-**Scott,T.M;Rose,J.B.; Jenkins,T.M.Farrah.,S.R.&Lukasik,J.(2002).**Microbial Source Tracking :Current Methodology &Future Direction .App.Enviro.Microbial Vol.68 No. 12,pp 5796 – 5803.

14-**Donnen ,L.D.(1961).**"The influence of crop and soil percolating waters " proceeding of ground water recharge conference , California/U.S.A.

15-**Salman, N.A. (1977).** Some observations on some physiochemical features of two side branches of the Shatt Al-Arab River Bull. Basrah. Nat., His. Mus. 4: 41- 49.

16-**Owens, M., Knowles ,G. and Clark, A.(1977)**. The redaction of the distribution of dissolved oxygen in river ,In coulstion Frederic and mark,Emil., water quality ,Academic press, INC. London, LTD ; p.125-137.

17- **Roagers, W.A. (1962)**. A study of two stream receiving domestic Sewage proc. 16th. Ed. Ann. Conf. South east. Assoc. Grame & Fish. Commiss. Charleston. South Crolina, 449- 463.

18-**Kobaisi, Abdel-Rahman (1996)**. Indeed, environmental River Saddam Ph.D. thesis, Ibn al-Haytham College of Education, University of Baghdad.

19-**Qasim,Ibrahim,Thar(1986)**.Environmental study on the penthic lhaljee in the some marshes area for Iraq south. Master thesis College of science University of Basarh.1-144.

20-**Wetzel, R.G. (2001)** .Limnology lake and river ecology, 3th ed.Academic press. An Elsevier science imprint.