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Assessment of some physical and chemical properties of the Tigris River water passing through Al-Dour District

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***Abstract*---**The current study was conducted on the course of the Tigris River passing in the district of Al-Dur / Salah Al-Din Governorate, with three stations distributed along the distance of the study area, for the period from the beginning of November 2021 until April 2022. The first station ST1 is located near the water purification project of Al-Bu Ajil area and the station The second station, ST2, is located at the crossing, and the third and last station, ST3, is located near the Al-Dour silo. The study included the measurement of some physical factors (air temperature, water temperature, electrical conductivity) and some chemical factors (pH, total hardness, calcium ion, magnesium ion). The results showed that the air temperature ranged between 12-22°C, while the water temperature ranged between 8-20.5°C. As for the electrical conductivity, it recorded values between 499,54-679.45µs/cm, while the pH values were neutral. Its levels ranged between 7.34-8.04, and the total hardness may have been affected by the geological characteristic of the land on which the water flows in the stations, and it was found that its water is hard, which may be mostly caused by the bicarbonate ion. Calcium values ranged between 75.60-63.90 mg/L, and the magnesium ion ranged between 29.53-15.01 mg/L. The averages of the months were also recorded as shown in Table (1-1).

***Keywords*---**Tigris River, physical and chemical properties, Al-Dour district.

Introduction

Water is an essential element that contributes to sustaining life on the planet, creating cities and flourishing industries (Khan et al., 2020). The management of fresh water resources is important for policy makers under the influence of climatic, social and economic factors (Osman et al., 2019). The percentage of water is estimated at 71% of the area of the globe and it is either salty or fresh, including oceans, seas, rivers, groundwater and it is in the form of snow and others (Mhaisen, 2018).

Water has distinctive physical and chemical properties, which made it important in its uses for various purposes, and that the living things in it show a high sensitivity to the change in its physical and chemical characteristics. These factors affect the nature of life for the living organisms that live in it (Melo and Hazar, 2000).

Materials and working methods

The study area is located on the Tigris River passing in Al-Dur District / Salah Al-Din Governorate, which lies between longitudes (33.10-42.30) on the east side and two latitudes (35.20-33.45) on the northern side (Rajab, 1985), and the Tigris River crosses about 250 km Within Salah El-Din Governorate, it is an important and main resource for surface water in the governorate, and it penetrates it from north to south.

Water samples were taken from three other locations at a different distance along the Tigris River in a governorate within Salah al-Din Governorate, monthly throughout the study period, from November 2021 to April 2022, with an indication that sampling from the river was between eight in the morning and nine in the morning. Half in the morning.

1- The first station near the Bu Ajil water purification project.
2- The second station (Al Maabar).
3- The third station behind the silo of marketing grains of the role.

Water samples were taken using plastic (opaque) bottles with a capacity of 1.5 liters after washing them several times with river water at each site and taking into account that the nozzle of the bottle is under the surface of the water, using samples for the influence of air and then taking samples for the laboratory, some measurements were made in the field, which is the temperature (air and water) and then transferred to the laboratory in an ice box and analyzed on the same day directly.

Physical and chemical examinations

Air and Water Temperature:

The air and water temperature was measured using a mercury thermometer with a range of 0-200°C and a step of 0.1°C.

Electrical Conductivity

The ability of water to transmit electric current was recorded using an electronic Conductivity Meter, an Oyster type, to measure the electrical conductivity of the samples in terms of μs/cm.

pH

Use a Lovibond electronic pH meter after calibration before using it with buffer solutions of pH 9-7-4.

Total Hardness (T.H.)

The method (ASTM, 1984) was applied to estimate the total hardness by following the EDTA method, and the total hardness was calculated using the following equation:

$$\text{Total Hardness(ml/L)} = \frac{\text{VEDTA x NEDTA x 1000 x M.W. as CaCo3}}{\text{volume of sample(ml)}}$$

The result is expressed in mg calcium carbonate/L.

calcium ion Ca+

The calcium concentration was measured according to the method described in Lind (1979).

$$\text{Calcium concentration mg/L} = \frac{\text{A× B ×400.8}}{\text{Volume of Sample (ml)}}$$

A = standard volume of EDTA consumed per flush.
B = 1 mg weight of calcium carbonate equivalent to 1 ml of EDTA.

Magnesium Ion Mg+

The method used in Lind (1979) was used to calculate the magnesium concentration from the calcium concentrations and the total hardness values of the samples, as in the following equation:
Magnesium concentration (mg/L) = [total hardness – (calcium hardness)] x 0.243

Results and Discussion

Air and Water Temperature

The air temperature ranged between 12 - 22 °C, as the temperature was 12 °C in January 2022 at the third station ST3, while the highest air temperature was recorded at 22 °C in November 2021 in the first station. ST1. As for the water temperature, its values ranged between 11-20.5 °C, as the lowest value recorded

during the study period was 11 °C in February 2022 at the third station ST3, while the highest value recorded was 20.5 in November 2021 at the first station ST1. The rise and fall in water temperature is due to its influence on weather changes in the studied area, and this is consistent with the results of many researchers' studies on water bodies in Iraq (Al-Ta'i, 2000; Mansour, 2019; Muhammad, 2021).

Electrical Conductivity

The conductivity recorded values that ranged between 679.45-499.54 µs/cm, the highest value was 679.45 µs/cm in January 2022 at the second station and the lowest value was 499.54 µs/cm in November 2021 at the third station. The conductivity is directly proportional to the concentration of the salts present, and is a measure of the quality and quantity of ions dissolved in water (Bhat et al., 2018). These values, in recording the highest conductivity values in winter, agreed with the results of Al-Dulaimi (2021), as the values they reached ranged between 651-145 µs/cm.

pH

The results showed that the pH values ranged between 8.04-7.34, and the lowest value was 7.34 in November at the first station, and the highest value was 8.04 in April at the third station. The values were very close to each other. The values were similar over the study period. These values are consistent with mansour (2019), as the values of their results ranged from (7.0-8.2) mg / liter.

Total Hardness (T.H.)

The total hardness recorded values that ranged between 303.6-246.4 mg/L, with the highest value reaching 303.6 in January 2022 at the second station, and the lowest value was 246.4 in March 2022 at the same station. The difference in the concentration of total hardness during the summer and autumn seasons is caused by the evaporation process and the difference in the concentration of dissolved salts in water, which results from many natural and human activities (Pradeep et al., 2012). These values are consistent with Ismail (2018), as the values of their results ranged from (300-200) mg / liter.

calcium ion Ca+

Calcium ion concentration recorded values ranging between (75.60-63.90) mg / liter, the highest value was recorded at 75.60 in November 2021 at the first station, and the lowest value was 63.90 in March 2022 at the first station. It is noted from these results that the calcium ion concentration was high during the autumn (November) and low during the winter (March). 2001). It is noted from these results that the calcium ion concentration was high during the fall season (November) and low during the winter (March).The reason is attributed to the geological formation of the earth, since calcium ion concentrations are always higher than magnesium ion concentrations in water(Al-Shawani, 2001). These values came close to the study of Al-Quraishi (2011), where the results obtained

ranged from 96-64 mg/l, and less than the study of Al-Sadoun (2021), as the values ranged between 231.1-61.5 mg/l.

Magnesium Ion Mg+

The values of magnesium concentration were recorded between 29.53-15.01 mg/L, as the highest value was 29.53 mg/L in April 2022 at the first station, and the lowest value was 15.01 mg/L in November 2021 at the first station. The reason for the preponderance of calcium concentrations over magnesium throughout the study period is due to the presence of agricultural lands and the containment of drained irrigation water on fertilizer residues, which precipitate magnesium in the form of magnesium sulfate (Al-Fatlawi, 2005).

These values were lower than the study of Al-Sadoun (2021), as the values of its results ranged (231.1-61.5) mg / liter.

year and month checkups	2021		2022			
	Novem ber	December	January	February	March	April
Air Temperature	20.8	18.2	12.5	13.7	17.2	18.2
Water Temperature	19.7	15.8	11.7	11.5	15.5	15.7
pH	7.6	7.7	7.8	7.9	7.8	7.8
E.C.	519	561.9	666.7	653.2	535.1	557.8
T.H.	258.1	255.2	278.7	284.5	253.7	284.5
Ca	70.5	70.2	71.4	73.5	65.1	71.4
Mg	19.89	19.5	24.34	24.73	22.1	25.76

Table (1) shows the rate of laboratory tests

References

Al-Dulaimi, Heba Hamad Muhammad (2021). An environmental study of the algae present in the Tigris River passing through the city of Dhuluiya - Salah al-Din Governorate. Master's Thesis, College of Education for Girls - Tikrit University.

Al-Fatlawi, Hassan Jamil Awad. (2005). An environmental study of the Euphrates River between Al Hindiya Dam and Al Kifl District - Iraq. Master's Thesis - University of Babylon.

Al-Quraishi, Rowaida Abdul Rahman Jabbar (2011). The environmental impact of the Kut Dam on the benthic biology of the Tigris River. Master's Thesis, College of Science for Women - University of Baghdad.

Al-Saadoun, Diaa Wissam Kamel (2021). An ecological study of mud algae in Rafid Diyala / Iraq. Master's thesis, College of Education - Samarra University.

Al-Shawani, Tawoos Muhammad Kamel Ahmad (2001). An ecological and microbiological study of the Lower Zab River from the Kubiri area to Hawija, Tamim Governorate. Master's thesis / College of Education for Girls - Tikrit University.

Al-Tai, Rushdi Sabah Abdel-Qader (2000). A preliminary study of phytoplankton and some physical and chemical properties in the waters of the Tigris River within Salah al-Din Governorate. Master's thesis, College of Education for Girls - Tikrit University.

ASTM (American Society for testing and Materials) .(1984). Annual book of ASTM standard water , printed in Easton Md, USA. 1129PP .

Bhat, M.A. Wani, S.A. Singh, V.J. Sahoo, J.Tomar, D. and Sanswal, R.(2018).An overview of the assessment of groundwater quality for irrigation. J. of Agricultural Sci. and Food Research., 9(1): 1-9.

Ismail, Hala Mahmoud (2018). Effect of environmental pollutants on ectoparasites in three species of fish of the Tigris River. Master's thesis / College of Education for Girls, Tikrit University. Iraq.

Khan, U., Haque, M. I., And Khan, A. M. (2020). Environmental sustainability awareness in the Kingdom of Saudi Arabia. The Journal of Asian Finance, Economics, and Business, 7(9) : 687–695.

Lind . O.T. (1979) . Hand book of common methods In Limnology 2nd ed . The . C.V . Mos . by . Co., St . Louis .199P.

Mansour, Maad Abdullah (2019). Effect of some environmental aspects of the infection of three species of fish of the Little Zab River with external parasites in the city of Kirkuk. Master's thesis / College of Education for Girls, Tikrit University. Iraq.

Melo , S .; V.L.M. Haszar (2000). Phytoplankton in an Amazonian flood-plain lakel lago Batata , Brazil diel variation and species , Strategies V . Plankton Res.,V.(22).pp. 63-76

Mhaisen , F.T.(2018). Index –catalogue of parasites and disease agents of fishes of Iraq . (Unpublished).

Mohamed, Enas Hamdoun (2021). The effect of the environmental conditions of the waters of the Little Zab River within the district of Altun Kobri on the infestation of three types of fish with external parasites. Master's thesis / College of Education for Girls, Tikrit University. Iraq.

Osman, Y., Al-Ansari, N., & Abdellatif, M. (2019). Climate change model as a decision support tool for water resources management in northern Iraq: A case study of Greater Zab River. Journal of Water and Climate Change, 10(1), 197–209.

Pradeep, V.; Deepika, C.; Urvi, G.; Hitesh, S.(2012). Water Quality Analysis of an Organically Polluted Lake by Investigating Different Physical and Chemical Parameters. Int. J. Res. Chem. Environ. 2, 105–111.

Rajab Abdel Fattah Habib (1985). Geographical distribution of industry in Salah al-Din Governorate. Master Thesis. Faculty of Education. Baghdad University.

Santoso, P., Adrianta, K. A., & Wiranatha, I. G. (2021). Phytochemical screening and in vivo test of dewandaru (Eugenia uniflora L) fruit extract on mice exposed to cigarette smoke. *International Journal of Health & Medical Sciences*, *4*(2), 246-252. https://doi.org/10.31295/ijhms.v4n2.1722

Widana, I.K., Sumetri, N.W., Sutapa, I.K., Suryasa, W. (2021). Anthropometric measures for better cardiovascular and musculoskeletal health. *Computer Applications in Engineering Education*, *29*(3), 550–561. https://doi.org/10.1002/cae.22202