Ramification role Of Urban Sewage in Al-Shatrah sub-district River Pollution

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Abstract: The practical field study was carried out at three point located along (Al-Shatrah river) (A. Park – B. Hospital – C. Al- Abbasiyah) in this district (Shatrah) Thi-Qar, its to investigate the role of sewage water from the residential areas around the river which divided the city into two sides, this river is branch from (Al-Garraf-Canal).

This study analyzed some (physicochemical and biological parameters) for the sewage water and recognized the potential pollution sources at selected three station of study, the variance major analysis parameter (pH- E.C- B.O.D- C.O.D- T.D.S- T.S.S- CL- SO4- PO4- NO3) moderated for samples from the field station was treated chemically during the time of study three months (June, July, August 2019), appeared variance differentiated in value rate among the three stations according to the pollution sources. The highly domestic wastewater from the houses, shops were the main influents factors affected water-quality. Our study can be usefully applied to help the local authority in order to prevent the pollution of most important life source for humans-plants-animals.

Key words: waterwaste, river pollution, water quality, Discriminant analysis.

Introduction
The water is very important natural resource not only for human but also includes animals plants, the expand development of society regarding to agriculture, industry and economics facilities.[1] The rivers now are not the only nutrize humans and urban consumption, but also receive waste-water instead came from very different and multi-humans activity such as hose cleaning which used detergents, random car wash station include battry cell charge and oil change, hospitals, dispensary and clinics, even the larg climate effect which damage the surface water basin[2], all that sources contain organic and inorganic elements even heavy metals, these chemical elements identifying as the main reason of disturbing water river quality patterns, the way of discharge human waste water directly to the river without any further treatment cause the regression of water-quality.

Some of the wastewater which dumped to the river contaminate with micro-bacterial led to fatal disease affected humans (Immune system) or (Intestinal tract)[6].

The industry development and the need of people to use the technology at different domin in regular life make that all chemical materials available in the local-stores and shops before that its only used at factories and work-shops[4].
Previous studies have alerted during the investigation and paper results that (Iraq) currently encounter water-problems even with local-spatial distribution [7,4].

**Experimental work:**

During the period of study about three months of summer of 2019. River water samples were collected from three stations with the average of each station point every week. The three stations were located at different districts: (A. Park) located at the north of the district, (B. Hospital) center of the district, and (C. Al-Abbasiyah) at the south of the district. The coordinates of the study area are (N-31°23'29.58", E-46°10'02.78") [3,5]. The samples were preserved, physical-chemical properties examined according to the methods of treating the water and waste-water for the American Health Association [15,1] by the regulation ways for analysis [8,10].

![Map of Al-shatrah and river](image)

Figure (1) the location of Al-shatrah and the river

**Results and discussion**

Regarding Table (1) we noticed that (pH) was convergent and within the basic range, which is common for Iraqi water. The station (C) showed a relative decrease in (pH) value (6.75) compared to other stations, this due to the station located in the south of the city and receives a lot of industry and home residue from the urban north. Residue after degradation will release (CO₂) to the surrounding water, leading to a decrease in pH value [8,9].

The low value of (pH) in river water indicates a hazardous influence that affects the aquatic environment because the acidity of water prevents the species environment from continuing for the time of living and maintaining chemical circulation [12].
Also there is increase at the $E.C$, $B.O.D$, $T.D.S$, $T.S.S$, $C.L$ value for the station (C) in compare with other (A) and (B) because the geographical location of station and high rate of sun evaporation due to increasing of temperature climate in summer which decrease water-level and highly rate from urban sewage-water dumped in the river carried by the current to the south of district[13].

At station (B) we notice high value of $C.O.D$ near the hospital that’s came from the high percentage of organic-waste from the shops, cafes and house at both side of river, waste water contain many organic compound which the microbiology specious cannot degrade it[12,14].

![Figure (2) the location of study (A.B.C) in AL-Shatrah district](image)

| Variables      | Loc° A | Loc° B | Loc° C |
|----------------|--------|--------|--------|
| $pH$           | 8.1    | 7.20   | 6.75   |
| $E.C$ dS.m     | 2.19   | 3.89   | 4.98   |
| $B.O.D$ mg.l   | 49     | 52     | 82     |
| $C.O.D$ mg.l   | 98     | 150    | 119    |
| $T.D.S$ mg.l   | 401    | 1840   | 2560   |
| $T.S.S$ mg.l   | 179    | 231    | 894    |
| $C.L$ mg.l     | 298    | 601    | 720    |
| $SO_4$ mg.l    | 193    | 320    | 400    |
| $PO_4$ mg.l    | 3.15   | 3.96   | 5.87   |
| $NO_3$ mg.l    | 20.3   | 13.0   | 8.01   |
Figure (3) the sewage pipe into river

Table (2) Pearson-correlation diagram (water-quality vs. sites parameters)

| Para. | PH | [E.C] | [B.O.D] | [C.O.D] | [T.D.S] | [T.S.S] | Cl | SO₄ | PO₄ | NO₃ |
|-------|----|-------|---------|---------|---------|---------|----|-----|-----|-----|
| PH    | 1  | -0.998| -0.807  | -1.000  | -0.797  | -0.998  | -0.998| -0.913| 0.997|
| [E.C] |    | 1     | 0.844   | 0.513   | 0.998*  | 0.834   | 0.993 | 1.000 | 0.938| 1.000|
| [B.O.D]|   | 1     | 0.028   | 0.807   | 1.000*  | 0.773   | 0.841 | 0.978 | 0.853|
| [C.O.D]|   | 1     | 0.567   | -0.045  | 0.613   | 0.517   | 0.833 | 0.183 | 0.498|
| [T.D.S]|   | 1     | 0.797   | 0.998   | 0.998   | 0.913   | 0.997 | 0.997 | 0.997|
| [T.S.S]|   | 1     | 0.762   | 0.832   | 0.974   | 0.844   |       |      |     |
| Cl    |    | 1     | 0.993   | 0.889   | -0.990  |         |      |      |     |
| SO₄   |    |       | 1.000*  | 1.000   |         |         |      |      |     |
| PO₄   |    |       | 1.936   | 1.000   |         |         |      |      |     |
| NO₃   |    |       | 0.944   | 1.000   |         |         |      |      |     |
The [Pearson-correlation] of three sampling sites is combined of (10) parameters in water samples collected from the river.

A strong significant negative correlation between PH and (EC, BOD, TDS, TSS) and with (CL, SO4, PO4) and positive with (NO3) that’s mean the rate of reaction between water component play very effective role in chemical reaction and this is clear indication of the different type of pollution[11].

A strong significant positive correlation between BOD and (TDS, TSS, CL, SO4, PO4) and negative with (NO3) that’s came from high rate of organic material pollution in the water of river. Even it’s clearly that water polluted by organic-materials from the (gas chromatography test) fig (4) by calculation of quarantine time lapse [5].

![Figure (4) gas chromatography for water samples](image)

The results of this research refer to that naturalist and anthropogenic pollution sources had clearly role affects water quality of (Shatrah-river) according to multivariate methods from the three monitoring station by using cluster analysis and chemical and physical methods to show the water characteristics at different station (A,B,C) along with river stream through the district. All three point are polluted but arranged from high to less (C>B>A). The C station was high polluted more than the norm rate based on (world health organization) that came from the geographical loc in south and the water current of river carried all waste and gathered at( C ) and the water contain a large number of poison and heavy metal and parasite which is affected the humans, animals and plants so that need primary treatment before dumped in the river which is the vital sources of life.

References
1. Al-Imarah, F.J.M., Al-Shawi, I.J.M., Al-Mahmood, H.K., and Hmood, A.Y. "Study of some physical and chemical characterizations of water from the southern Iraqi marshlands after rehabilitation/2003". Marsh Bull. 2006, 1(1).pp: 82-91.
2. H.T. Al-Saad, M.A. Al-Hello, S.M. Al-Taein and A.A.Z. DouAbul."Water quality of the Iraqi southern marshes" , Mesopot. J. Mar. Sci. 2010. 25 (2).pp: 188 – 204.

3. Lone, M. I. Saleem, S. Mahmood, T. Saifullah, K. and Hussan, G ,"Heavy metals contents of vegetable irrigated by Sewage /tub well water". International Journal of Agriculture and Biology.(2003). 5(4). pp: 533-535.

4. Salam Hussein Ewaid ,Salwan Ali Abed, "Water Quality Assessment of Al-Gharraf River, South of Iraq Using Multivariate Statistical Techniques", Journal of Al-Nahrain University Sci. 2017.20 (2). pp:114-122.

5. Singh, K.P., Malik, A., Mohan, D., Sinha, S.,"Multivariate statistical techniques for the evaluation of spatial and temporal variations in water quality of Gomti- River(India): a case study". Water Research.2004. 38(18).pp 3980-3992.

6. Vega, M., Pardo, R., Barrado, E., Deban, L, "Assessment of seasonal and polluting effects on the quality of river water by exploratory data analysis". Water Res. Dec.1998.32(12).pp:3581-3592.

7. Rabee, A. M., Abdul-Kareem B. M. and Al-Dhamin A. S. "Seasonal Variations of Some Ecological Parameters in Tigris River Water at Baghdad Region, Iraq". J. of Water Resource and Protection. 2011. 3(4). pp: 262-267.

8. Zhou, F., Liu Y. and Guo H. C. "Application of multivariate Statistical methods to the water quality assessment of the watercourses in the northwestern New Territories" Hong Kong. Environmental Monitoring and Assessment. 2007. 132(1-3).pp:1-13.

9. Simeonov, V., Simeonova, P. & R. Tsitouridou. "Chemometric quality assessment of surface waters: two case studies" Chem. Eng. Ecology, 2004.11(6). pp: 449-469.

10. Kannel, P.R., S. Lee, S.R. Kanel and S.P. Khan "Chemometric application in classification and assessment of monitoring locations of an urban river system" Analytica Chimica Acta, 2007.582(2). pp:390-399.

11. Dirilgen, N."Accumulation of Heavy metals in Freshwater organisms: Assessment of Toxic Interactions". Turk. J. Chem. 2001. 25(2).pp: 173-179.

12. Al Saqqar, A.S.; Hashim, A.; and Ali, A.M. "Water quality index assessment using GIS case study: Tigris River in Baghdad City". International Journal of Current Engineering and Technology. 2015.5(4).pp: 2515-2520.
13. Tyagi, S.; Sharma, B.; Singh, P.; and Dobhal, R. "Water quality assessment in terms of water quality index ".American Journal of Water Resources.2013.1(3).pp:34-38.

14. Al-Mosewi; T.J.K. "Water quality of Al-Hammar marsh South Iraq". Journal of Engineering. 2009.15(3).pp:3999-4008.

15. Rodger B. Baird, Andrew D. Eaton, Eugene W. Rice .2017." Standard methods for examination of water and wastewater "23rd Edition. Washington DC 20001-3710. American Public Health Association.