International Journal of Research
Available at https://journals.pen2print.org/index.php/ijr/
e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 06 Issue 08
July 2019

Evaluation the effect of untreated sewage on Al-Gharraf River in Al-Hayy city using Geographical Information System (GIS)

Baydaa Ismail Ibrahim[1], Ali Nasser Hilo[2], Imzahim AbdulKareem Alwan hD[3]
[1] Water Resources Department, Kut Technical Institute, Middle Technical University, Iraq
[2]Department of Civil engineering ,Wasit University,Iraq
[3]Building and construction Engineering Department , University of Technology Baghdad,Iraq

Abstract:

The aim of the present study is to know the effect of raw sewage from the Al-Haay city on some of the chemical, physical properties of Al-Gharraf River. The Al-Gharraf River, located in the south-eastern sector of Iraq and surrounded by vast and agricultural lands. The river receives most of the wastewater coming from many activities including industrial, agricultural, and domestic wastewater. Associated with the development of the area, the increase of pollutants into the river has been a recent cause for alarm. Seven sampling stations were selected along the Al-Gharraf River. Monthly sampling was carried out from January 2016 till April 2016, two samples were taken each month. Four parameters are selected to cover the sewerage problem. These are (TSS, TDS, PO4, CL) for Garraf river, The total dissolved solid 721-1980 mg / L, Total suspended solid values ranging from 84-590 mg / L with. The chlorides values varied from 39 --277 mg / L, phosphate values ranged between 0.50 - 14.7 mg/L The study describe the increasing in concentration of these parameters obviously with Iraqi Environment Limitation for surface water. And this increasing was harmonic with decreasing water levels because of rainfall decreasing especially at last years. These pollutants were provided to the river through pump stations that constructed in the city. 9 station pumps sewage water to the river directly without treatment. High concentration areas were located that more than the required levels in addition to within the allowable levels these concentrations were explained and analyzed at map technique (GIS).

Keywords: Al-Gharraf River, ***raw sewage, chemical, physical properties, GIS.***

Introduction

Water pollution is any directly or indirectly change in the physical, chemical or biological properties of water. So that it's become less valid for different uses like drinking, or domestic or agricultural or industrial use Water problems considered one of the problems that was intensified in the recent years, particularly in the Arab countries, because it is located in the dry and semi-dry climate, and the lack of water resources [1]. The interest in the study of pollutants and sewage water that are the main cause of pollution of rivers, as well as other contaminants (factories, laboratories, hospitals), are Increased because it has a negative influence on the properties of physics, chemical and biological. The solid and liquid wastes discharged to surface water and marine products, is the main reason for water pollution. If it can be classified as waste that causes pollution of water into three main groups are sewage, industrial waste and agricultural pollutants [2]. The Iraq sewage more million of liters per year and that so far there is no national plan to deal with them according to the strategy of sustainable use as is the case in some developed countries, so the indiscriminate use of these waters by the direct use in the fields and farms and added to rivers will lead to environmental effects serious **and healthy in the community(3).**

MATERIALS AND METHODS

General description of the Project

AL-Haay is Iraqi city and center of distract in Wassit province. It is a large city ancient there is one of the most followers of the Ahl Al-Bayt (peace be upon them) Saeed Bin Jubair AL-Asudai, and there lot of families ancient and home to a group of Iraqi tribes originally located on the both sides of AL-Gharraf river, which divides the city into the state and Karrada in term of the orchards and fruit , is located in the southern province of Wassit and mediates AL-Haay city among the cities of Al-Kut from the north and the Qalat Sukkar from the south, and away from the for the Kut city (Wassit province) with 45 km and from Qalat Sukkar (Dhi Qar province) at 35 km and from Baghdad by 220 Km. and from Qadissiya (129) km to the west and from Missan
(206)km
The Al-hayy city is located in the upper

International Journal of Research
Available at https://journals.pen2print.org/index.php/ijr/
e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 06 Issue 08
July 2019

southern region of Iraq , where the average height is (57)m above sea level The population of AL-hayy city is approximately 178.988 according to2014 census with an annual growth rate of 3% MMPW&COSIT,2006). to meet the rate of population growth new housing construction is proceeding rapidly together with industrial, commercial and developments Figure 1.

Figure (1) Area of study Al-haay city.

Al- Gharraf River water bodies of poor nutrition, which is suffering from fluctuation in water levels, especially in the summer when the water level drops to the lowest level l**.** Some natural qualities of the Gharraf river, Length 168Km, Maximum width 100 m,Mean width 60 m, Maximum depth 9 m, Mean depth 4m. Study area Gharraf River 80-95 m width and length of the river in the study area is 4500 m as shown in figure (2).

Figure(2) Sewage effluent discharging to Al- Garraf

Stream sampling

The object of stream sampling is to obtain a representative, reliable measure of water quality along a stream course. Care should be taken to obtain a sample that is truly representative of existing conditions. Consideration must be given to the type of samples and to where, when, and how many of them should be taken. A river must be sampled at different point transversely in the channel, which greatly add to the number of samples required to obtain a reliable mean for the section (4)

1. A sample in the middle of the stream and the point of pumping station discharge, at 0.6m depth would be sufficient. The dates of sampling for this study are from (10/1/2016) to (25/4/2016), these samples fairly represented the body of water or wastewater from which they were taken as much as possible. There was no significant change in the samples between the collection and analysis time. To achieve the objectives of the study, information concerning (PO_4, CL,TSS,TDS) are needed. Such information will be connected and interfered adequately to facilitate the study results. All samples are collected from Garraf river by boats from the locations that depicted in Figure (3) The concentration was read for the (PO_4,CL, TSS, TDS) materials as mentioned in the section (2-3). The number of samples was 56 and took period of approximately four months, two days for each month in the (first and last of month) between (10/1/2016)and (25/4/2016) these samples were collected from bottles and analysis in laboratory without delay so that the effects of delaying can be neglected

Figure (3) location of the sample and pipes sewage

Results and Discussion

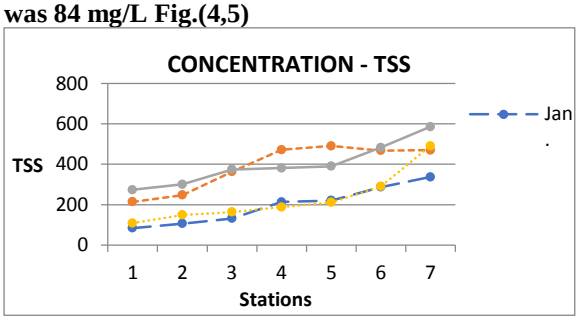
In this section, presents data analysis and explanation and analysis of the samples studied from Garraf River in the area between the Dam No. 1 with water Al-pusher station. As well as, it includes a description methodology using GIS programs. The pollutants that studied and analyzed was (TSS,TDS,PO4 ,CL). The following articles describe these materials as well as the concentration

International Journal of Research
Available at https://journals.pen2print.org/index.php/ijr/
e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 06 Issue 08
July 2019

and specification study area . In this chapter, we note an increase and a decrease in pollutants and sewage rates water.

TSS

The term "total suspended solids" (TSS) applies to the dry weight of the material that is removed from a measured volume of water sample..The total suspended solids may be organic and inorganic, that are suspended in the water. These would include silt, plankton and industrial wastes. Source of total suspended solids includes erosion from urban runoff and agricultural land, industrial wastes, bank erosion, bottom feeders, algae growth or wastewater discharges [5]. Present study findings showed that the maximum value of TSS recorded in March at station 7 which was 585 mg/L while the minimum value was recorded in **January at station 1 which was 84 mg/L Fig.(4,5)**



Figure(4) TSS Concentration

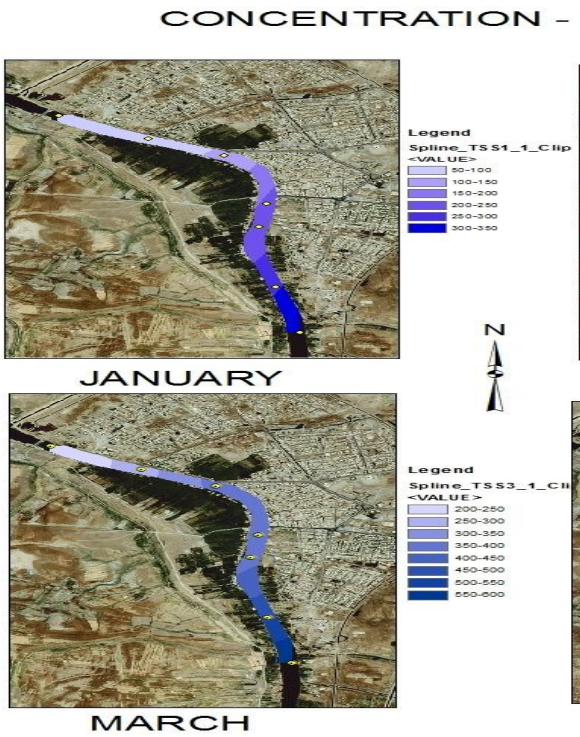
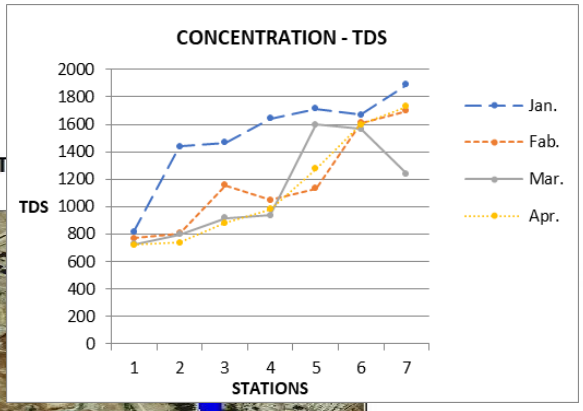


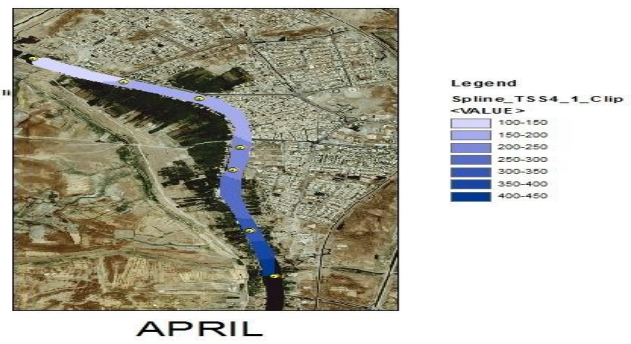
Figure (5) Effluent TSS Concentration

TDS

The concentration and composition of TDS in natural waters are determined by the geology of the drainage, atmospheric precipitation and the water balance (evaporation-precipitation)[6] . The present study results showed that the maximum value of TDS1888 mg/L was found at station 7 in month January , while the minimum value721 mg/L was found at station 1 in April (Fig 6) and Figure7). High value of TDS recorded during winter period could be related to increase in the load of soluble salts, mud, increase in the urban and fertilizer runoff, wastewater, septic effluent, decaying plants, animals and erosion of river banks. Lower value of TDS recorded in spring period might be due to dilution factor and sedimentation of suspended solids and slow decomposition rate during spring period. Results of the current study in a significant difference in the value of total dissolved solids. Since TDS is a good indication of the salinity of the water, and gives general information on the amount of ions in the water. Reducing the most desirable of dissolved solids of irrigation water in 2500,

according to the criterion of Iraq.





International Journal of Research
Available at https://journals.pen2print.org/index.php/ijr/
e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 06 Issue 08
July 2019

Figure(6) TDS Concentration

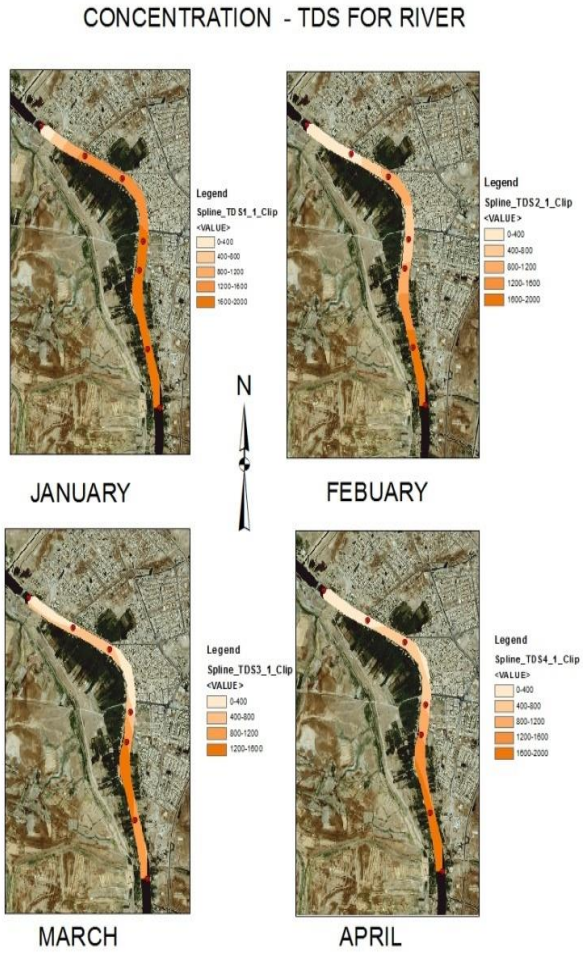
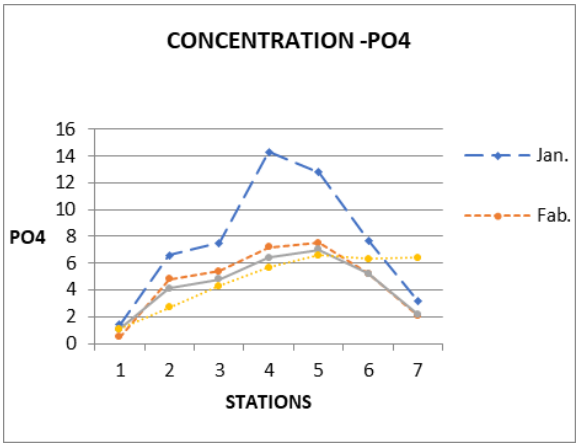


Figure (7) Effluent TDS Concentration

PO4

Phosphorus is the principal growth-limiting nutrient for macro plankton and phytoplankton growth in freshwater rivers and lakes and is the main cause of eutrophication in rivers and lakes. Additional phosphorus encourages algal growth beyond the natural levels. This growth depletes the dissolved oxygen in the water, and fish kills in rivers .The major sources of phosphorus are domestic sewage, detergents, agricultural effluents with fertilizers and industrial waste water. Higher concentration of phosphorus, therefore, is indicative of pollution. The phosphate concentration in Al-Garraf River ranged from The maximum value. 14.3 mg/l in station 4 month January, and the minimum value 0.5 mg/l in station 1 in month February in. Increasing levels of PO4 in Al-Garraf River may be due to high concentration of detergents in untreated sewage that might be the cause of high concentrations.(Figure8)and Figure(9)



Figure(8) PO4Concentration

CL

CL Chloride exists in all natural waters, the concentrations vary very widely and reaching a maximum in sea water (up to 35,000 mg/l). In fresh waters the sources include soil and rock formations, sea spray and waste is charged. Sewage contains large amounts of chloride, as do some industrial effluents [7]. In natural water chloride occurs in widely varying concentration. Abnormal chloride concentration may result due to pollution of sewerage, waste and leaching of saline residues in the soil. Its desirable limit is 200-250 mg/L beyond this limit, taste, corrosion and palatability are affected; and deficiency of chloride also an influence of the productivity of the agriculture. The minimum value of Chloride (39 mg/L) was recorded at station 1 month march, while the maximum value (275 mg/L) was found in station 5 months January. The increase of Cl- value in station 4 and 5, indicates to pollution by sewage in the waters of Al-Gharraf river due to the discharged sewage from the Al-Haay city enriched with organic matter as shown in figures (10,11).

International Journal of Research
Available at https://journals.pen2print.org/index.php/ijr/
e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 06 Issue 08
July 2019

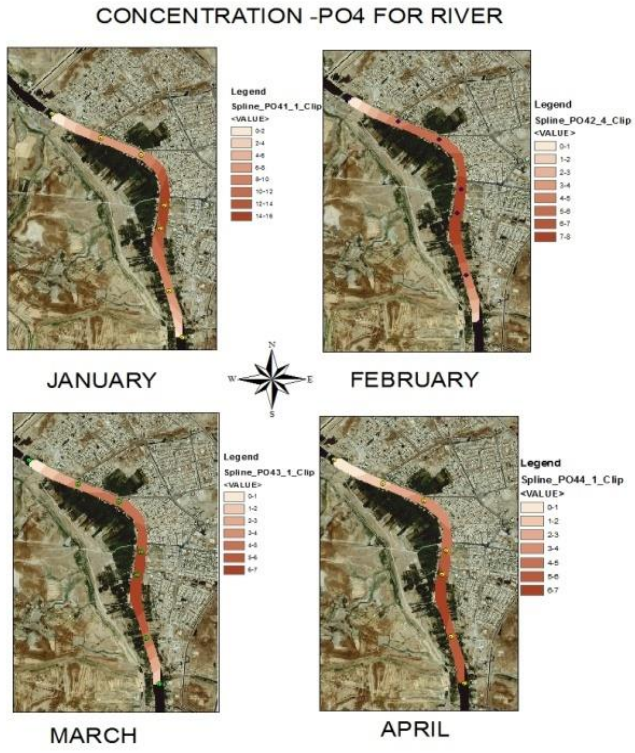


Figure (9) Effluent PO4 Concentration

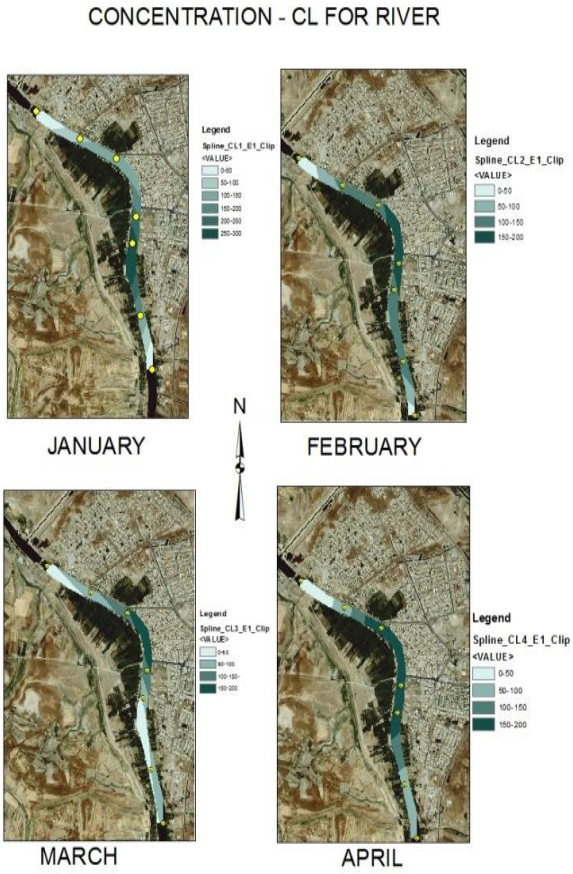
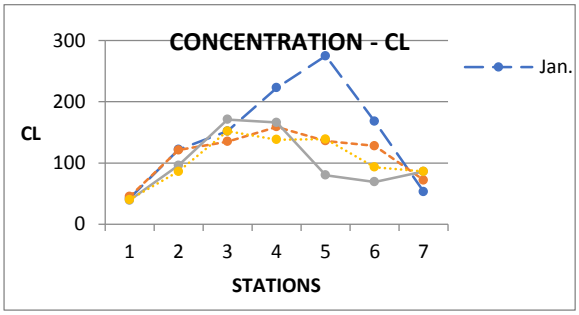


Figure (11) Effluent CL Concentration



Figure(10) CLConcentration

Conclusions

1. **It seems that was contaminated Obviously Al Gharraf River domestic sewage water.**

2. **In the high water level and flow of the river to increase speed. Self-purification of the river. Where pollutants significantly decreased rates in the high water level and flow of the river to increase speed.**

3. **Decays almost pollution, as we move away from the causes of pollution and sewage is treated, which is the pollution in the city center only. Any contamination confined area in the city center and only a distance of 4 km**

4. **Station (5) and the most polluted site is exposed to the effects of sewage discharged city, which lies directly in the**

river.

5. **Suspended solids. Higher high water level is significantly increased when the flow and increasing speed. TSS reached the highest incidence (590)mg/l in the third month (march) .**

6. **The highest percentage of pollution in a market in the city center and high population density where he became a cumulative pollution in the region east. Station (5).**

References

I. AL Zarka, Mohammed Abdel Nasser, (2010), the Islamic University of Gaza / Faculty of Arts / Department of Geography "Tlut water in the provinces of North, Central and human health impacts Ai."

II. Hassan, Wesal , Fakhri, (2011), the University of Basra / Marine Science Center "sparked Almtdvqat pollute nearby water drainage points in Basra / Iraq province".

III. Mnagd, Mahmod, houidi, and his group,(2013), the College of Agriculture / University of Anbar "evaluate some of the characteristics of sewage treatment in Fallujah."

IV. Nemarow ,N.L., " Scientific Stream Pollution Analysis " McGraw-hill, New york 1974.

V. Bamakanta, G.;Sunakar, P.; Satyabhama,T. and Prasad, T. U. (2013).Seasonal variation of Nagavali River water quality at the vicinity of paper mill near Jaykaypur, Odisha, India.Int. Res. J. Environment Sci.Vol. 2(5): 46-52.

VI. Phyllis K. W. and Lawrence K. D. (2007). Effects of total dissolved solids on aquatic organisms:A review of literature and recommendation for Salmonid Species.Am. J. Environ. Sci. 3 (1): 1-6,ISSN 1553-345X.

VII. Ezeribe, A. I.; Oshieke, K. C. and Jauro, A. (2012).Physico-chemical properties of well water samples from some Villages in Nigeria with cases of stained and mottle teeth. Sci. World J. Vol. 7 (1): ISSN 1597-6343.