MARSH BULLETIN 17(2) September (2022) 114– 124

MARSH BULLETIN

ISSN 1816-9848

Assessment of environmental pollution by heavy Elements in the Sedimentary at Abu Al-Kahsib River in Basrah province- southern Iraq

Malak H. Al-Tamimi*, Hamza H. Kadhim, **Abdel-Zahra A. Al-Hello
*Department of Geology, College of Science, University of Basrah,
** Marine sciences center, university of Basrah, Basrah, Iraq.
malakhassanyacub@gmial.com

(Received 3 May 2022; accepted 11 July 2022)

Abstract

A study of the Abu Al-Khasib River was conducted to show the state of the River and its impact on various pollutants, including heavy elements in its sediments, starting from the Lakta area and ending at its connection point with the Shatt Al-Arab. The study period extended from September 2020 to February 2021. Five heavy elements were estimated (Iron, Copper, Lead, Cadmium, and Chromium) in the sediments, and the heavy elements were extracted by standard methods using atomic absorption spectrometry. The results proved that the rates of heavy metals concentrations in the Sediments took the following order: (Iron> Copper >Chromium > Lead > Cadmium). Its concentration ranged between (1118-3731,0.234-1.450,0.897-1.428,0.015-0.256,0.001-0.009) µg\g dry weight, respectively. When comparing our results with previous studies, we find that all the values of the elements were among their predecessors, except for iron, which recorded higher values than what was recorded by previous studies. This increase is attributed to industrial activities, especially minerals, in addition to its presence in the soil, as it is the most abundant element in the earth's crust, in addition to the frequent dumping of wastes that contain iron in its composition. Pollution evidence was also calculated, and the results showed the highest value of the Geo Accumulation Index (I geo). Iron reached (0.0207); the study also recorded the highest value of the Enrichment factor (EF) for copper (2.515) and also recorded the highest value of the Contamination factor (CF) for iron (0.074). We conclude that the study area is classified as locally contaminated with iron and not contaminated with the other elements.

Keywords: sedimentary pollution, heavy elements, Abu-Al-Kahsib River.

Introduction

The study and evaluation of sediment pollution with heavy elements are of great importance because of its effects on the aquatic environment and the multiple pollutants it contains and from different sources, whether human, agricultural or industrial (Pardo *et al.*,1990; Boughriet *et al.*,1992; Klavins *et al.*,2000; Yu *et al.*,2001; Long and Morgan,1990). sediments are good evidence of the aquatic environment with many toxic elements. Over the past decades, numerous studies of sediment surfaces have shown that they are an excellent tool for determining the effects of natural and anthropogenic processes on sedimentation environments (Kwon and Lee,2001; Vinodhini and Narayanan,2008). The concentration and accumulation of these elements in the sediment texture, grain size, mineral composition, reduction\oxidation state, adsorption processes, absorption, and physical transfer. And the increase in the surface area of these sediment granules will increase the possibility of holding the elements and thus increasing their concentrations) Linnik and Zubenko,2000; Cousins *et al*.,2002; Nguyen *et al*.,2005; Ashfaque,1999; Buccolieri *et al*.,2006; Al-Taaiy,1999; Salman,2007; Hassan,2007). Sediments also play an important role in the recharge of heavy elements in aquatic systems under appropriate conditions and the interactions between sediments and the water column (Uzairu *et al*.,2009). And it becomes a source of water pollution if its surfaces are saturated with mineral pollutants (Al-Sabah,2007).

A study of the Abu Al-Khasib River was conducted to show the state of the River and its impact on various pollutants, including heavy elements in its sediments.

Materials and Methods

Description of the study area

The study area is located in far southern Iraq. It extends on the right bank of the Shatt Al-Arab for a distance of 16 km. It is described as an agricultural area located southeast of Basra Governorate, at an altitude of 3 meters above sea level, 32.30 longitudes, and 48.04 latitudes. The Abo al-Khaki River is one of the main and important water sources for agricultural and domestic use. It derives its water from the waters of the Shatt al Arab, which passes through it and divides it into several secondary branches. The southern region is characterized by an incomplete geological structure and is located within the plain sedimentary area, characterized by its flatness and low slope, except for some low-rise hills in some areas.

Figure (1) map of the study area

Table (1) locations, latitude, and longitude for the study area

Site number	site name	latitude	longitude
-1	lakta	30.462663	48.003858
-2	Bab twill mosque	330.452207	47.99711
-3	Shaikh Ibrahim	30.448988	47.994169
-4	Bab Suleiman wood bridge	30.441034	47.98732
-5	Jikor Bridge	30.439247	47.986732
-6	Shatt al-Arab	30.43637	47.978499

Methodology

Fieldwork

In two periods, sediment samples were collected from the mid-river point, totaling six sediment samples. The first period included sampling before the rain, while the second period included sampling after the rain. The benthic sediment samples were collected using a Grab sampler.

Laboratory work

After the samples were collected for the study site and dried under the sun, they were transferred to the laboratory and dried in an oven to ensure moisture removal. It was ground with a ceramic mortar and then sieved with a metal sieve with 36 mesh holes to prepare it for analysis.

Extraction of heavy metals

Acids have digested into the samples, then the concentrations of heavy elements were measured using a device Atomic Absorption Spectrophotometer. They were estimated according to the previous method (APHA,2005).

Results and discussion

The concentrations of (iron, copper, chromium, cadmium, and lead) were measured in the sediment samples in the study area during two periods. The first period included samples before the rain, while the second period included samples after the rain, as shown in the following table (2).

Table (2) Concentrations of heavy metals in sediment samples d during two periods in units (µ\g dry weight)

Element	period	L.1	L.2	L.3	L.4	L.5	L.6	Mean	SD
Fe	Before	8428	1058	1075	1052	9714	1057	3731	4157
	After	1031	1033	1104	1124	1195	1221	1118	79.453
Cu	Before	0.078	0.156	0.234	0.234	0.468	0.234	0.234	0.130
	After	1.25	1.160	2.767	1.696	0.101	1.726	1.450	0.873
Pb	Before	0.009	0.009	0.009	0.009	0.018	0.018	0.015	0.005
	After	0.236	0.184	0.453	0.249	0.137	0.281	0.256	0.108
Cr	Before	0.769	1.282	1.282	0.769	0.25	1.025	0.897	0.388
	After	1.339	1.331	1.174	1.582	1.79	1.357	1.428	0.219
Cd	Before	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0
	After	0	0.002	0.014	0.009	0.004	0.023	0.009	0.008

Table 2 showed that the rates of heavy elements concentrations in the benthic sediment samples of the study area took the following order: (iron>copper> chromium>lead>cadmium). The highest rate of iron was (3731) µg\g dry weight before the rain, while its lowest rate was (1118) µg\ g dry weight after the rain. That the highest rate of copper was (1.450) µg\g dry weight after the rain, while its lowest rate was (0.234) µg\ g dry weight before the rain. The highest rate of chromium was (1.428) µg\ g dry weight after the rain, while its lowest rate was (0.897) µg\ g dry weight before the rain. The highest rate of cadmium was (0.009) µg\ g dry weight after the rain, while its lowest rate was (0.001) µg\ g dry weight before the rain. The highest lead rate was (0.256) µg\ g dry weight after the rain, while its lowest rate was (0.015) µg\ g dry weight before the rain. It is clear to us the high iron values at all locations during the two periods in sediment samples. The increase of iron is due to industrial activities, especially minerals, and its presence in the soil as its most abundant element in the earth's crust (Al-Saraii,2009). we also note an increase in the rate of copper after rain. The reason for this is its presence in source rocks, organic materials, clay, industrial absolutes, waterway networks, human waste, and soil washing operations that contain copper in their composition (Al-Saraii,2009). we also note an increase in the rate of chromium during the two periods. The reason for this is due to the various human activities, agricultural and industrial, such as the fertilizer plant and power plants, which contribute to throwing large quantities of their waste into the River without any treatment (Al-Sabah,2007).in addition to its presence in nature, as well its presence in food sources and the proximity of the area to the siba field. We also note that the cadmium and lead concentrations rates were very low in all locations and during the two periods. The reason for this decrease is due to the adsorption processes that get on the surfaces of clay minerals, which increase with increasing hydrogen (pH) (Bonito,2005), as well as to the process of oxidation and reduction (Sillanpaa,1972). when comparing our results with the previous studies, we find that all the values of the elements were among their predecessors, except for the values of iron, which recorded higher values than what was recorded by the previous studies. The reason may be due to the different contributions of the flows and amount they carry, as well as the prevailing climatic conditions of the region from atmospheric factors in addition to the continuous washing operations and the role of the mitigation process, and others. Therefore, river sediments are classified as locally contaminated with iron and not contaminated with other elements.

Table (3) comparison between the rates of heavy metals concentrations in the sediments of the Abu-Al-Khatib River with previous studies.

location	cadmium	copper	iron	lead	chromium	source
Al-Chibayish marsh	0.41	-	-	25.20	19.70	Al-Atbei,2018
Bani-Hassan stream-iraq	30.27	0.47	1320.88	40.11	221.79	Al-Sharifi,2014
Euphrates River	26	0.87	-	24.4	-	-Akbar and Khazali,2012
Abu-Zairq marsh	2.99	-	-	73.76	-	Al-Abadi,2011
Euphrates River	30.40	0.30	203	11.17	-	Al-Kafaji,2010
Some wetland in south of Iraq	2.52-26.62	-	-	26.54	-	Mahmood,2008
Iraq wetland	23.02	7.88	762.14	67.62	-	Al-Imarah *et al*,2007
Euphrates River	14.14	11.22	661.70	0.59	0.47	Salman, 2007
Hilla river-iraq	34.45	3.92	119.78	58.20	325.50	Al-Taaiy,1999
Abu-Al-Khasib river-iraq	-0.001 0.009	-0.234 1.450	1118-3731	0.015-0.256	1.428-0.897	Current study

Assessment of Sedimentary pollution with heavy elements

<u>1-Geo Accumulation Index (I geo):</u>

It is a function of the pollution in the sediments with heavy metals. The sediments were classified according to Muller 1979. It depends on the concentration of the element in the earth’s crust as a reference concentration of the elements, due to the difficulty of obtaining a reference sample resulting from the increase in human influences on the environment.

As in table 5, the (I geo) was calculated for the studied elements during the two periods (before and after the rain).

Table (4) classification (Muller, 1979).

Igeo value	Sediments pollution case
I geo ≤ 0	Practically Unpolluted
0 ≥ I geo ≤ 1	Unpolluted
1-2> I geo	Unpolluted to moderately polluted
2-3 >I geo	moderately polluted to polluted
3-4 >I geo	Strongly polluted
4-5 >I geo	Strongly to extremely
5 > I geo	Extremely polluted

Table (5) (I geo) for sediment samples in units µ\g dry weight

I geo	period	L.1	L.2	L.3	L.4	L.5	L.6	Mean	Pollution level
Fe	Before	0.0338	0.0043	0.0042	0.0389	0.0389	0.0042	**0.0207**	practically unpolluted
	After	0.00041	0.00041	0.00044	0.00045	0.000479	0.000490	**0.000448**	practically unpolluted
Cu	Before	0.00060	0.00120	0.00180	0.00180	0.00361	0.00180	**0.0018**	practically unpolluted
	After	0.00964	0.00895	0.0213	0.0130	0.000779	0.0133	**0.0133**	practically unpolluted
Pb	Before	0.00012	0.00012	0.00012	0.00012	0.00024	0.00024	**0.00096**	practically unpolluted
	After	0.00315	0.00246	0.00606	0.00333	0.00183	0.00375	**0.00343**	practically unpolluted
Cr	Before	0.00257	0.00428	0.00428	0.00257	0.000836	0.00342	**0.0029**	practically unpolluted
	After	0.00447	0.00445	0.00392	0.00529	0.00598	0.00453	**0.00477**	practically unpolluted
Cd	Before	0.00143	0.00143	0.00143	0.00143	0.00143	0.00143	**0.00143**	practically unpolluted
	After	0	0.00374	0.0187	0.0125	0.00628	0.030	**0.1187**	practically unpolluted

When comparing the values of (I geo) between the locations during the two periods, we find that the highest rate of (I geo) for iron is (0.0207) before the rain, while the lowest rate is (0.000448) after the rain. The highest rate of (I geo) for copper is (0.0111) after the rain, while the lowest rate is (0.001802) before the rain. The highest rate of (I geo) for chromium is (0.00477) after the rain, while the lowest rate is (0.00299) before the rain. The highest rate of (I geo) for cadmium is (0.1187) after the rain, while the lowest rate is (0.00143) before the rain. The highest rate of (I geo) for lead is (0.00343) after the rain, while the lowest rate is (0.00096) before the rain. The highest value of the (I geo) was for iron before the rain, and this is due to its presence in nature, as well as high temperatures and increased evaporation, which in turn leads to an increase in its concentration in the environment, in addition to the dumping of waste containing iron in its composition. The study area is practically unpolluted with heavy elements by comparing the results with Muller's table.

2-Enrichment factor (EF)

Use the concentration of iron, as it is the most prevalent in the earth's crust (Huheey, 1983).

The (EF) was calculated for the studied elements during the two periods (before and after the rain) as in table 7.

Table (6) classification (Atgin *et al*., 2000)

Enrichment factor	Enrichment degree
1 < EF	No enrichment
2<≤ EF 1	The least possible enrichment
5<≤ EF 2	Moderately enrichment
20<≤ EF 5	A significant percentage of enrichment
40<≤ EF 20	Very high enrichment
EF ≥ 40	Extremely enrichment

Table (7) (EF) for sediment samples in units µg\g dry weight

EF	period	L.1	L.2	L.3	L.4	L.5	L.6	Mean	Pollution level
Fe	Before	1	1	1	1	1	1	1	The least possible enrichment
	After	1	1	1	1	1	1	1	The least possible enrichment
Cu	Before	0.0177	0.2835	0.4186	0.4277	0.0926	0.4257	0.277	The least possible enrichment
	After	2.331	2.1595	4.8198	2.9017	0.1625	2.718	2.515	Moderately enrichment
Pb	Before	0.0035	0.0283	0.0279	0.0285	0.0061	0.0567	0.0251	The least possible enrichment
	After	0.7630	0.5937	1.3677	0.7384	0.3821	0.7671	0.768	The least possible enrichment
Cr	Before	0.0128	0.0213	0.0213	0.0128	0.00416	0.017	0.01489	The least possible enrichment
	After	0.0223	0.0221	0.0195	0.0263	0.0298	0.02261	0.02380	The least possible enrichment
Cd	Before	0.00714	0.00714	0.00714	0.00714	0.00714	0.00714	0.00714	The least possible enrichment
	After	0	0.0186	0.0933	0.0626	0.0313	0.1533	0.05988	The least possible enrichment

When comparing the values of (EF) between the locations during the two periods, we find that the highest and lowest rate of (EF) for iron is (1) in all locations during the two periods. The highest rate of (EF) for copper is (2.515) after the rain, while the lowest rate is (0.277) before the rain. The highest rate of (EF) for chromium is (1.064) after the rain, while the lowest rate is (0.586) before the rain. The highest rate of (EF) for cadmium is (1.547) after the rain, while the lowest rate is (0.028) before the rain. The highest rate of (EF) for lead is (0.768) after the rain, while the lowest rate is (0.0251) before the rain. We noticed that all (I geo) values of all elements were higher after the rain. The reason may be due to the effect of currents and cold air due to lower temperatures after rain and the lack of evaporation processes, which leads to increased environmental elements. We conclude that the study area is Moderately enriched with copper and the least possible enrichment with cadmium, chromium, iron, and lead. The presence of copper in these proportions is due to the presence of source rocks, organic materials, clay, industrial absolutes, waterway networks, human waste, and soil washing operations that contain copper in their composition (Al-Saraii,2009).

3- Contamination factor (CF)

It is the most important criterion expressing sediment pollution. The (CF) was calculated for the studied elements during the two periods (before and after the rain) as in table 9.

Table (8) classification (Pekey *et al*.,2004).

Contamination factor	Contamination degree
1<CF	Low Contamination
<3 CF<1	Moderately Contamination
6<CF < 3	High Contamination
6 >CF	Extremely Contamination

Table (9) (CF) for sediment samples in units µ\g dry weight

CF	period	L.1	L.2	L.3	L.4	L.5	L.6	Mean	Pollution level
	Before	0.1685	0.0217	0.0215	0.0210	0.1943	0.0211	0.074	Low contamination
Fe	After	0.0206	0.0206	0.0220	0.0224	0.0239	0.02442	0.02232	Low contamination
	Before	0.003	0.006	0.009	0.009	0.009	0.018	0.009	Low contamination
Cu	After	0.0480	0.0446	0.1064	0.065	0.0038	0.0333	0.0501	Low contamination
	Before	0.0006	0.0006	0.0006	0.0006	0.0012	0.0012	0.0008	Low contamination
Pb	After	0.0157	0.0122	0.0174	0.0166	0.00913	0.0187	0.01495	Low contamination
	Before	0.0128	0.0213	0.0213	0.0128	0.00416	0.017	0.01489	Low contamination
Cr	After	0.0223	0.0221	0.0195	0.0263	0.0298	0.02261	0.02380	Low contamination
	Before	0.00714	0.00714	0.00714	0.00714	0.00714	0.00714	0.00714	Low contamination
Cd	After	0	0.0186	0.0933	0.0626	0.0313	0.1533	0.05988	Low contamination

When comparing the values of (CF) between the locations during the two periods, we find that the highest rate of (CF) for iron is (0.074) before the rain, while the lowest rate is (0.02232) after the rain. The highest rate of (CF) for copper is (0.0501) after the rain, while the lowest rate is (0.009) before the rain. The highest rate of (CF) for chromium is (0.02380) after the rain, while the lowest rate is (0.01489) before the rain. The highest rate of (CF) for cadmium is (0.05988) after the rain, while the lowest rate is (0.00714) before the rain. The highest rate of (CF) for lead is (0.01495) after the rain, while the lowest rate is (0.0008) before the rain. We note that the (CF)values for all elements were higher after the period of rain. This is due to the increased movement of agricultural and industrial currents and flows, sewage water, atmospheric precipitation, and acid rain, which add a high percentage of these pollutants to the environment. We conclude that the study area is less polluted with heavy elements.

Conclusions

Through the concentrations of the elements, we find that the river sediments are classified as locally contaminated with iron and not contaminated with other elements. The results of (I geo) the study area are practically unpolluted with heavy elements by comparing the results with Muller's table.

References

Akbar, M. M. and Khazali, A.M. G. (2012).Estimation of heavy elements concentrations in the water and sediments of the Garraf River-DHIqAR.Dhi Qar Science Journal 3(3): 30-42.

Al Sabah, B. J. J. (2007). Study of the physicochemical behavior of the mineral element polluting the water and sediments of the Shatt al-Arab.Ph.D. Thesis, College of Agriculture, University of Basrah,p.188.

Al-Abadi, H.J.S. (2011). Investigation of microbial and metal contamination of waters and sediments in Abu-Zariq Marsh southern of Iraq. M.Sc.0 Thesis, College of Science, University of Thi-Qar.

Al-Atbee, Rehab Salim Khazaal (2018). Assessment of some heavy elements and hydrocarbons in the water, sediments and Dominant Aquatic plants at Al-Chibayish marshes.

Al-Imarah, F.J.M.; Hantoush, A.A. and Nadir, A.M. (2007). Petroleum hydrocarbons in water and sediments of N.W.Arabian Gulf, 1980-2005.Aquat. Ecosys. Health and Manage., 10: 335-340.

Al-Khafaji, B.Y. (2010). Distribution pattern of selected heavy metals in water,sediment, and two species of fish from Al-Hammar marsh south of Iraq. Paper presented to the fifth scientific conference 2010, College of Science-University of Babylon: 115-124.

Al-Sabah, B. J.J. (2007). Study of physicochemical behavior of polluted mineral elements for water and sediments of Shatt Al-Arab. Ph.D. Thesis, College of Agriculture, Uni of Basrah, 223 pp.

Al-Saraifi, A. N. A. (2009).Environmental effects of industrial pollutants in the province of Maysan.Master thesis. College of Arts-university of Basrah, p.216.

Al-Sharifi, Aqeel Abbas Hamad (2014). Possible contamination with heavy elements and some ecological parameters of water Bani-Hassan stream in the province of Karbala-Iraq.

Al-Taaiy, M. M. S. (1999). Trace elements in the water, sediments, fish, and plants of the Shatt al Hilla River. Ph.D. thesis, college of science, university of Babylon, p 129.

APHA (American Public Health Association) (2005). Standard Methods for the Examination of Water and

Wastewater .21 th edition. Washington, D.C., USA,1193 PP.

Ashfaque, K .N.(1999). Analysis of heavy metals in bed sediments of Dharmonell lake.M.Sc. Thesis.

Atgin, R.S.; O. El- Agha;A. Zararsiz; A.Kocatas; H.Parlak and G.Tuncel,(2000).Investigation of the sediment pollution in Izmir Bay: trace element. Spectrochim. Acta B.,55()7:115-1164.

Bonito, M.D. (2005). Trace elements in soil pore water: a comparison of sampling methods. Ph.D., University of Nottingham, 263 pp.

Boughriet, A., Quddance, B., Fischer, J.C., Wartel, M., & Leman, G. (1992). Variability of dissolved Mn and Zn in the Seine Estuary and Chemical speciation of these metals in the suspended matter. Water Res, 26, 1359-1378.

Buccolieri, A., Buccolieri, G., Cardellicchio, N., Atti, A.D., Leo, A.D., & Maci, A.(2006).Heavy metals in marine sediments of Taranto Gulf (Ionian Sea, Southern Italy). Marine Chemical, 99, 227-235.

Cousins, T.M.; Mulquin, D.B. and Pickering, J.L. (2002). Survey of heavy metals in sediments of the Manly Lagoon Catchment in freshwater. Ecology Report 2002, Department of Environmental Sciences, University of Technology, Sydney. 32 pp.

Hassan, Wessal Fakhri (2007). A geochemical and hydrochemical study of the sediments of the Shatt al-Arab stream and the waters in contact with it.Ph.D. Thesis, College of Agriculture, University of Basrah, p.205.

Huheey, J. E. (1983). Inorganic chemistry: Principles of structure and reactivity. Harper and Row, Publishers, New York, 912.

Kabata – Pendias, A. (2011). Trace Elements in soils and plants. CRC Press, Taylor and Francis Group.

Klavins, M., Briede, A., Rodinov, V., Kokorite, I., Parele, E., & Klavina, I. (2000). Heavy metals in Rivers of Latvia. Sci of the Total Environ, 262, 175-183.

Kwon, Y.T.and Lee, C.W. (2001). Sediment metal speciation for the ecological risk assessment. Analytical Sci., 17: 1015-1016.

Linnik, P.M. and Zubenko, L.B. (2000). Role of bottom sediments in the secondary pollution of aquatic Environ by heavy metals compounds. Lakes & Reservoirs: Res &Management, 5: 11-21.

Long, E.R. and Morgan, L.G. (1990). The potential for biological effects of sediment –sorbed contaminations tested in the National status and trends program. NOAA Technical memorandum NOSOMA 52. National Seattle Washington, 175 pp.

Mahmood, A.A. (2008). Concentrations of pollution in water, sediments, and aquatic plants in some wetlands in the south of Iraq. Ph.D. Thesis, Uni of Basrah, College of Science, 244 p. (In Arabic).

Muller, G.1979). Schwermetalle in den sediment des Rheins-Veranderungen seit 1971.

Nguyen, H.L.; Leermakers, M.; Osan, J.; Torok; S. and Baeyens, W. (2005). Heavy metals in lake Balaton. Water Colum, Suspended matter, Sediment, and biota. Sci of the Total Environ 340: 213-230.

Pardo, R.; E. Barrado; L. Perez and M. Vega. (1990). Determination and association of heavy metals in sediments at the pasturage River. Water Res. 24: 373-379.

Pekey, H., Karakas, D., Aybert, S., Tohun, L. and Bakoglu, M. (2004). Ecological risk assessment using trace Elements from surface sediment of Izmit Bay (Northeastern Marmara Sea). Turkey. Mar. Pollut.Bull., 48: 946-953.

Salman, Karim Hussein Khuwaidam (2007). A study in the environmental reality of Basrah Governorate. Ph.D. thesis, college of science, university of Baghdad.

Sillanpaa, M. (1972). Trace elements in soil and agriculture. FAO, Soil Bulletin, 17, FAO of UN.

Uzairu, A., Harrison, G.F.S., Balarabeand, M.L., Nnaji, J.C. (2009). Concentration Levels of Trace Metals in fish and sediment from Kubanni River, Northern Nigeria, Bull. Chem. Sci. Ethiop, 23(1), 9 pp.

Vinodhini, R.; Narayanan, Mm., (2008). Bioaccumulation of heavy metal in organs of freshwater fish Cyprinus carpio (common carp). Int. J. Environ.Sci. Tech., 5(2): 179-182(4 p).

Yu, K.Y.; Tasi. L.J.; Chen, S.H. and Ho, S.T. (2001). Chemical binding of heavy metals in anoxic river sediments. Water Res, 35(7): 406-409.

تقييم التلوث البيئي بالعناصر الثقيلة في رواسب نهر ابو الخصيب في محافظة البصرة - جنوب العراق

ملاك حسن يعكوب التميمي ,* حمزة عبد الحسن كاظم ,** عبدالزهرةعبدالرسول الحلو

* قسم علم الارض \ كلية العلوم \ جامعة البصرة- العراق. ** مركز علوم البحار\جامعة البصرة -العراق.

malakhassanyacub@gmial.com

المستخلص

اجريت دراسة نهر ابو الخصيب لبيان حالة النهر ومدى تاثره بالملوثات المختلفة ومنها المعادن الثقيلة في رواسبه, ومقارنتها بالمحددات القياسية المحلية والعالمية, ابتداءا من منطقة اللكطة وانتهاءا بنقطة اتصاله بشط العرب. امتدت فترة الدراسة من سبتمبر 2020 – ولغاية فبراير 2021. تم تقدير خمسة عناصر ثقيلة وهي (الحديد,النحاس,الرصاص,الكادميوم والكروم) في الرواسب القاعية, وقد استخلصت العناصر الثقيلة بطرق قياسية وباستخدام جهاز مطياف الامتصاص الذري.بينت نتائج الدراسة المتعلقة بالعناصر الثقيلة ان معدلات تراكيز العناصر في عينات الرواسب قد اخذت الترتيب التالي: (الحديد > النحاس > الكروم > الرصاص > الكادميوم).اذ تراوحت معدلات تراكيزها مابين (1118-3731 , 0.234-1.450 , 1.428 -0.897 , 0.256 -0.015, 0.009 -0.001) مايكروغرام \ غرام وزن جاف على التوالي.عند مقارنه نتائجنا مع الدراسات السابقة نجد ان جميع قيم العناصر كانت ضمن سابقاتها عدا عنصر الحديد سجل قيم اعلى مما سجلته الدراسات السابقة, تعزى هذه الزيادة الى النشاطات الصناعية وخاصة المعدنية اضافة لوجوده في التربة كونه العنصر الاكثر وفرة في قشرة الارض , اضافة لكثرة القاء المخلفات التي تحتوي على الحديد في تركيبها,كما تم حساب ادلة التلوث واشارت النتائج ان اعلى قيمة لمعامل التجمع الجيوكيميائي كانت لعنصر لعنصر الحديد اذ بلغت (0.0207).كما سجلت الدراسة اعلى قيمة لمعامل الاغناء لعنصر النحاس (2.515), وسجلت اعلى قيمة لعامل التلوث لعنصر الحديد (0.074). نستنتج ان منطقة الدراسة مصنفة على انها ملوثة محليا بالحديد وغير ملوثة بباقي العناصر.

الكلمات المفتاحية: تلوث الرواسب ، معادن ثقيلة ، نهر ابو الخصيب.