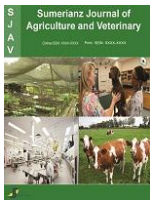
Sumerianz Journal of Agriculture and Veterinary, 2020, Vol. 2, No. 12, pp. 132-135
ISSN(e): 2617-3077, ISSN(p): 2617-3131
Website: https://www.sumerianz.com



Original Article Open Access

Effect of Aluozozab Sewage Disposal on Water Quality in White Nile River, Sudan

Durria A. Mohammed*
Department of fish sciences, Faculty of agricultural technologyand fish sciences, Neelain University, Khartoum, Sudan

AbdElgadir M. Manofal
Department of fish sciences, Faculty of agricultural technologyand fish sciences, Neelain University, Khartoum, Sudan

Ahmed M. Musa
Department of fish sciences, Faculty of agricultural technologyand fish sciences, Neelain University, Khartoum, Sudan

Abstract

This study was conducted during July to October 2017, in the White Nile at Khartoum state, to determine the effect of industrial sanitation and effluents of Aluzozab discharge channel, the discharge come from Soba Sanitation plant, Elyarmok industerial complex and other industerial waste water to the White Nile water quality, Water samples were taken every 10 days from (4) locations, location (A) southern Jebel Awulia dam, location (B) northern Jebel Awulia dam, location (C) the discharge channel, location (D) Northern of the discharge channel..Samples of water were taken to analyze some physical, chemical properties and lead (pb) concentration at the National center lab in Khartoum city.. The study concluded that there is no significant differences in temperature measurement in the (4) locations, but there was significant difference in electric conductivity, biological oxygen demand, chemical oxygen demand, dissolved oxygen and lead concentration. E.C values were (0.1345 ms/ cm) in site A, (0.1280ms/cm) in site B, (1.0185ms/cm) in site C, and (0.36775ms/cm) in site D. The BOD values were (5.630mg/l) in site A, (5.020mg/l) in site B, (58.770mg/l) in site C and (5.830mg/l)in site D The COD values were (11.840mg/l) in site A, (10.990mg/l) in site B, (136.900mg/l) in site C and (12.500mg/l)in site D.The lead concentration values in site A(0.0197mg/l). in site B (0.0329mg/l) , in site C(0.0585mg/l) and site D(0.0382mg/l). The dissolved oxygen concentration was high in site A (6.580mg/l), in site B (5.640mg/l), lower (0.780mg/L) in the discharge channel and (3.980mg/l) in site D that may be due to existence of pollutants.

Keywords: Sewage; Disposal; Water quality; Industrial; Sanitation; pollutants.

1. Introduction

Pollution is defined as discharge of pollutants directly or indirectly into the environment and has negative impacts on living organisms and ecosystems. Water is the life blood of our planet. It's a fundamental to the biochemistry of all living organisms .The earth's ecosystem are linked and (maintained by water, it drives plant growth and provides apermanent habitat for many species [1].With unique physical& chemical properties [2]**.** Sudan is a rich country in the surface water resources. The major industries that produce hazardous wastes include metals, chemicals, drugs, pharmaceuticals, leather, pulp, and paper, electroplating, refining, pesticides, dyes, rubber goods [3]. Organic and inorganic substances which are release in to the environment as a result of domestic, agricultural and industrial water activities lead to organic and inorganic pollution. Tabassum, *et al.* [4] The discharge of sewage and industrial effluent from Auozozab discharge channel into White Nile at Khartoum state has negative impacts on water quality**.**

1.1. The Objective of the Study

1. To investigate and identify pollutants from sewage and the industrial activities around the White Nile within Khartoum state.
2. To assess the effect of pollutants mainly heavy metals (lead) on the White Nile water quality

2. Materials and Methods

2.1. Study Area

Azuozab discharge channel is channelwhich carried sewage and industrial effluents from different sources in to White Nile in Khartoum state (Plate 1).The discharge come from Soba Sanitation plant, Elyarmok industrial complex and other industrial waste water**.**

2.2. Sampling Sites

The study focus on four positions (places), it took samples three times monthly (from July to October), and these positions were:

*Corresponding Author

Site (A), south of the dam in Jebel Awulia as the upstream.
Site (B), northof the dam in Jebel Awulia.
Site (C), Azuozab channel, it is an open channel carrying sewage from different places.
Site (D), in Azuozab (about 200 meters after the the disposal site.

2.3. Sample Collection

Water samples were collected in plastic and glass containers from the sources, and then transferred to the laboratory for analysis in 72 hrs as maximum. Some of the physical and chemical parameters were analyzed in the field such as temperature as the quality of waste may be changed due to oxidation or other processes which may take place.

2.4. Statistical Analysis

To make estimation of water quality using personal computer and advance computer programs Excel, SPSS. (Version 21)

3. Results and Discussion

3.1. Temperature

There was no significant effect on the discharge on water temperature in the four areas, South the Jebel Awulia dam area (A) with minimum value (24.0C^o), whereas the maximumvalue (28.0C^o), north Jebel Awulia dam area(B) with minimum value (25.0 C^o), whereas the maximumvalue (29.0 C^o), the discharge channel area (C) with minimum value (25.0$C^°$) whereas the maximumvalue (29.0C^o), Auozozab area (D) with minimum value (25.0 C^o), whereas the maximum value (28.0 C^o).These result are agreement with Sufian and Farah [5]. Table (1)

3.2. Water Electric Conductivity (E.C)

In Jebel Awulia area (A) the electric conductivity of water was between (0.083 mS/cm and (0.240mS/cm) with minimum value (0.083mS/cm) whereas the maximum one (0.240mS/cm). In Jebel Awulia area (B) the electric conductivity of water was between (0.088mS/cmand 0.210mS/cm) with minimum value (0.088 ms/cm) whereas the maximum one (0.210mS/cm).The disposal area (C) the electric conductivity of water varied between (0.102mS/cm and 1.900mS/cm) with minimum (0.102ms/cm) and maximum (1.900mS/cm). In Auozozab area (D) the electric conductivity varied between (0.085mS/cm and 0.288mS/cm). Then the high electric conductivity was present in the discharge channel, while the low electric was present in Jebel Awulia .The disposal area of downstream recorded high values of ionic which could be due to effect of sewage disposal. In the three areas (A, B, D) shows that there was no significant differences in electric conductivity. This result is agreement with Manofal [6], with Sufian and Farah [5]. Table (2)

3.3. Dissolved Oxygen (DO)

The result of study present that there was a highly significant difference in dissolved oxygen in four areas A, B, C and D.In Jebel Awulia south the dam area (A) the minimum DO was(5.6 mg/l) while the maximum (8.6 mg/l), in north the dam area (B) in Jebel Awulia the minimum value was (4.8 mg/l) while the maximum was (6.8 mg/l).The discharge channel area (C) recorded lower value of dissolved oxygen with minimum (0.2 mg/l) and maximum (1.4 mg/l).InAuozozab area (D) dissolved oxygen minimum value(1.4mg/L), while the maximum value(6.6mg/L) Table (3). There was high concentration of dissolved oxygen in Jebel Awulia while the disposal site was lower one. This result is agreement with Manofal [6] and Sufian and Farah [5]. And Adam, *et al.* [7]. This result was un agreement with Uosuf [8].

3.4. Biological Oxygen Demand (BOD)

The study shows that there was a highly significant difference between the disposal site and the three areas. The highest concentration of biological oxygen demand found in site C with mean (58.770 mg/l,that means BOD level is higher than the permissible limit set by (EPA,30mg/l).While the three areas the value was a proximately the same This result is agreement with Manofal [6], Sufian and Farah [5]. Table (4)

3.5. Chemical Oxygen Demand (COD)

The study shows that there was low concentration of chemical oxygen demand in the discharge channel with mean (136.900 mg/l) compare to (EPA, 250 mg/l) while the discharge higher COD concentration found compared to the three areas . This result is agreement with Sufian and Farah [5] Table (5).

High value of BOD, COD decreased DO, low dissolved oxygen has bad effects on aquatic organisms [6].

3.6. Heavy Metal Lead (Pb)

The study shows there was high concentration of Pb in the discharge site, with mean (0,0585) mg/l lower than EPA standard,0.1mg/l),but higher than WHO drinking water standard 1993. (0.01mg/l.Table 6). This result is agreement with [5], and Jaberi [9].

Table-1. The temperature from different areas under study

Areas	N	Mean	Std. Deviation	Minimum	Maximum	Sig
A	10	26.0[a]	1.4142	24.0	28.0	NS
B	10	27.0[a]	1.4907	25.0	29.0	
C	10	26.9[a]	1.3703	25.0	29.0	
D	10	26.6[a]	1.0750	25.0	28.0	
Total	40	26.625	1.3528	24.0	29.0	

NS= There are no significant differences
Means with same superscript letter have no significant differences

Table-2. The electric conductivity (E.C) from different areas under study

Areas	N	Mean	Std. Deviation	Minimum	Maximum	Sig
A	8	.1345[a]	.058461	.083	.240	**
B	8	.1280[a]	.048500	.088	.210	
C	8	1.0185[b]	.559876	.102	1.900	
D	8	.1900[a]	.071498	.085	.288	
Total	32	.36775	.468562	.083	1.900	

**= There are highly significant differences with (P≤0.01)
Means with same superscript letter have no significant differences

Table-3. The dissolved oxygen from different areas under study

Areas	N	Mean	Std. Deviation	Minimum	Maximum	Sig
A	10	6.580[a]	.8351	5.6	8.6	**
B	10	5.640[b]	.7168	4.8	6.8	
C	10	.780[c]	.3327	.2	1.4	
D	10	3.980[d]	1.5245	1.4	6.6	
Total	40	4.245	2.4155	.2	8.6	

**= There are highly significant differences with (P≤0.01)

Table-4. The biological oxygen demand (BOD) from different areas under study

Areas	N	Mean	Std. Deviation	Minimum	Maximum	Sig
A	10	5.630[a]	1.7211	3.9	9.9	**
B	10	5.020[a]	1.3088	3.2	8.1	
C	10	58.770[b]	20.0790	5.6	79.3	
D	10	5.830[a]	1.3342	4.1	7.9	
Total	40	18.813	25.3074	3.2	79.3	

**= There are highly significant differences with (P≤0.01)
Means with same superscript letter have no significant differences

Table-5. The chemical oxygen demand (COD) from different areas under study

Areas	N	Mean	Std. Deviation	Minimum	Maximum	Sig
A	10	11.840[a]	3.6427	8.7	19.3	**
B	10	10.990[a]	3.0816	8.2	17.4	
C	10	136.900[b]	47.7491	16.3	179.7	
D	10	12.500[a]	3.6212	9.1	19.3	
Total	40	43.058	59.5438	8.2	179.7	

**= There are highly significant differences with (P≤0.01)
Means with same superscript letter have no significant differences

Table-6. The lead concentration (Pb) from different areas under study

Areas	N	Mean	Std. Deviation	Minimum	Maximum	Sig
A	10	0.0197[a]	0.006183	0.012	0.030	**
B	10	0.0329[b]	0.011170	0.015	0.051	
C	10	0.0585[c]	0.020024	0.026	0.093	
D	10	0.0382[b]	0.014665	0.019	0.062	
Total	40	0.0373	0.019484	0.012	0.093	

**= There are highly significant differences with (P≤0.01)
Means with same superscript letter have no significant differences

4. Conclusions

*Although White Nile is one of the huge and running rivers but it is vulnerable to waste disposal by people specially who live in slums near river beach.

*The present study explain that chemical, physical and biological properties of Nile water affected by this pollutant and this was clear in drain area in the decreasing of dissolve oxygen and increasing in BOD and COD and pd concentration, also conductivity was high that mean organic and inorganic pollutant increased.

Recommendations

- Sewage water must be treated perfectly before reaching aquatic surfaces.
- Water is the most important ecosystem component and its conservation must be priority of governments and individuals.

References

[1] Michael, P. N., 2016. *Ecology. C b s publisher and distribution*. New Delhi-India.

[2] Holechek, L. J., Cole, A. R., Fisher, T. J., and Valdez, R., 2003. *Natural resources. Ecology, economics, and policy*. New Jersey: Prentice Hall.

[3] Misra, R. N., 2016. *Environment-2025. Discovery publishing house*. New Delhi: P V T. L T D.

[4] Tabassum, B., Bajaj, P., and Kumar, P., 2016. *Waste management and environmental health*. New Delhi (India): Published by: Namit Wasan.

[5] Sufian, A. S. and Farah, A. S., 2010. *The impact of sanitation on water quality and planktons*. Unpublished, In Arabic.

[6] Manofal, A. M., 2010. *The Impacts of Water Pollution on White Nile Water quality and fisheries at Khartoum state. PH.D in water polution , faculty of agricultural technology and fish science*. Sudan: Neelain university.

[7] Adam, A. E., Abdelgani, A. K., and Saeed, K. H., 2009. *Pollution of white nile water with waste water (unpublished)*. Arabic.

[8] Uosuf, A. F., 2008. *Study of white nile water pollution in north/ South Jebel awulia dam*. un published.

[9] Jaberi, H. M., 2014. "Heavy metals concentration in the bivalue corbicula fluminalis shells from shatt Al-Arab River." *Mesopotaminan Journal of Marine Science*, vol. 239, p. 29.