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Spatial and Temporal Variation of Raw Sewage of City of Annaba Major Discharge (Northeast Algeria)

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A B S T R A C T

The main objective of this study is to evaluate the physicochemical quality of urban sewage from the Annaba region and to recommend appropriate treatment for their reuse and reducing their harmful receptors such as Boukhadra (Site 1), El Bouni (Site 2) and Oued Forcha (Site 3). Analysis carried out for duration of one year (from March 2012 till February 2013). It was revealed that as an organic pollution resulted in a high BOD_5 and COD which can reach respectively (140.66 ± 26.62 mg/l of O_2) and (298.83 ± 84.40 mg/l of O_2) in Site 1, Site 2 is (147.16 ± 33.10 mg/l of O_2) for BOD_5, and (280 ± 55.67 mg/l of O_2) for COD and in site 3 the pollution load is represented by BOD_5 (149.5 ± 22.71 mg/l of O_2) and COD (287.33 ± 19.09 mg/l of O_2). Regarding the TSS, their annual average in three sites were 352.83, 340.83 and 369.26 mg/l, respectively. The reported data were far exceeded the Algerian standard (50 mg/l). The annual average ratio BOD_5/ COD for sites 1, 2 and 3 were in the order of 0.47, 0.52 and 0.5, respectively. These results lead the conclusion that the three sewage sites were polluted by organic pollution which was characterized by partially degradable.

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INTRODUCTION

Pollution is a serious problem to the environment; it includes any human action which degrades nature and any adverse change in the environment [1]. The laws are in force around the world to control the level of pollutants in the environment [2]. These pollutants are emitted into the atmosphere, discharged in wastewater or applied to soils, in the form of gases, dissolved substances or particles, most reach aquatic environments. Following the significant population growth and economic evolution experienced by the country in recent years. The environment is facing to disturbing changes in the surface water quality of the main Algerian, water courses caused by massive and uncontrolled pollution by both natural organic matters as industrial products [3]. The major and inevitable consequence of such a landfill is a production of leachate which can bring out serious environmental problems. Specifically, when the site is not provided with a containment system, leachates are rich in organic and inorganic pollutants, but also heavy metal materials, can contaminate water systems [4]. Finally, that lead to eutrophication of the receiving environment[5, 6]. Poor water quality can not only cause many treatment failures, but also be a predisposing factor of a whole range of pathologies of various etiology (chemical, bacterial, viral and parasitic) [7].

The main objective of this work is to characterize the urban sewage of the city of Annaba; which is the largest urban center in the East. For the realization of this study, three sites were surveyed (Oued Forcha, El Bouni and Boukhadra) and involved the monitoring and analysis of physico-chemical parameters in the light of a characterization of its wastewater. The choice of these discharges based on their location in the city, accessibility and most importantly because they are not connected to the treatment of the region of Annaba station.

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MATERIALS AND METHODS

Description of the site

The city of Annaba is located between latitudes 36 °30 N and 37 °30 N and longitudes 7 °20 E and 8 °40 E, in the extreme north-eastern Algeria, exactly 100 km from the border Algeria - Tunisia and 580 km west of Algiers, with an area of 1412 km².

It is limited geographically by the Mediterranean Sea to the north, by the province of Guelma the south, by the province of El Tarf east and west by the province of Skikda. Its population has been increasing over recent years to reach 657,756 inhabitants [8]. Present study was conducted at three sites in the center of this city site 1 (Boukhadra), site 2 (El Bouni) and Site 3 (Oued Forcha) (Figure 1)

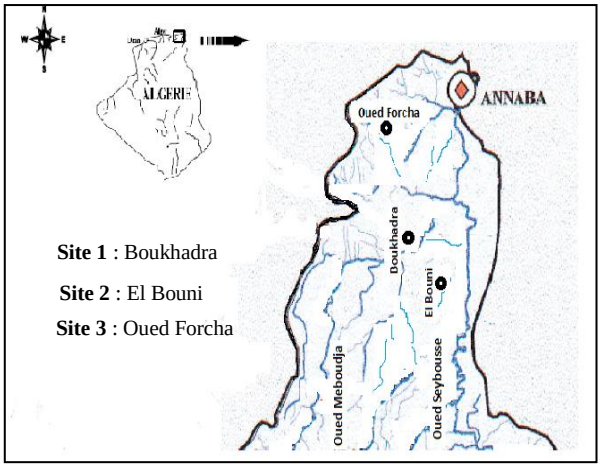

Figure 1. Location of disposal sites

Sample Collection

To take into account the seasonal variation of the effluent, the physico-chemical parameters were determined from bimonthly samples from March 2012 to February 2013. The sewage samples were collected in glass bottles of 500 ml and were kept in a cooler where the temperature is maintained at 4°C according to the general guide to the preservation and handling of samples[9].

Test Methods

The analysis was focused on the main parameters that characterized sewage, some parameters were determined immediately on sites such as pH, temperature, electrical conductivity, total dissolved solids (TDS) and salinity. The pH and temperature were determined by a pH-meter (Wagtech 525043) with a probe measuring the temperature. The electrical conductivity of water, total dissolved solids (TDS) and salinity measurements were taken with the multiparameter probe (WTW 197i). The suspended solid (TSS) were determined according to the standard (EN 872/2005). The dosage of the various components was performed by spectrometry, ammonium ions according to the standard (FN, T90-015), at wavelength of 630 nm. Nitrites and nitrates according to the standard (ISO 6777 / 1-1984), at wavelength 543 nm. Orthophosphates measured according to the standard method (ISO 6878 / 1-1986), at a wavelength of 885 nm. Finally, the COD and BOD_5 were determined by French standards (FN, T90-101) and (FN, T90-103), respectively.

Statistical Study

The results obtained were subjected to statistical analysis using the software MINITAB release 13.31 [10]. Data are represented by an analysis of variance with two classification criteria (location, time) which was performed using the ANOVA test.

RESULTS AND DISCUSSION

The results are shown in Figures 2 to 12. The average temperature of wastewater different sampling sites are generally between 11.8 to 20.1°C (17.73 ± 3.59°C) for site 1, from 14.8 to 23.7°C (18.61 ± 3.20°C) for site 2 and from 13.4 to 23.8°C (18.86 ± 3.97°C) for site 3. These results show a difference between the minimum and maximum recorded values. This could be related to seasonal variations with significant changes in ambient temperature in summer and winter (Figure 2). The values of the recorded temperature at the three sites are inferior to the standard 30°C, and considered as limited value for direct discharges into receiving environment [11]. The obtained results are consistent with the reported values in literature [12, 13].

Unlike equalities of means is very highly significant (at the p = 0.000) between the sites.

The pH values of wastewater discharged by these releases vary from 6.9 to 7.37 (7.01 ± 0.46) for site 1, from 6.15 to 7.68 (7.07 ± 0.50) for site 2 and from 6.17 to 7.42 (7.1 ± 0.50) for the site 3. The recorded pH values were relatively neutral. However, the slight reduction in pH was observed at the three sites in May, which can be explained by the dilution of the water (Figure 3). The annual average pH values are also in the meantime admitted [5.5-8.5] considered as limit values for discharges of liquid effluents discharged into the natural environment [11]. Similar results were recorded in Morocco [14].

Unlike equalities mean very highly significant (at the p = 0.000) from one site to another.

For electric conductivity recorded values fluctuated between 668 and 1201 µS/cm (1017 ± 204.66 µS/cm) for site 1, between 1076 and 1817 µS/cm (1462 ±

286.50 µS/cm) for site 2 and between 924 and 1946 µS/cm (1454 ± 353.73 µS/cm) for the site 3; The obtained electrical conductivity values demonstrate the significant mineralization of wastewater, at sites 2 and 3 relative to the site 1 (Figure 4). The recorded values of electrical conductivity at the three sites are inferior to Algeria standard which is equal to 2000 µS/cm [15]. Thus, these values are in agreement with values previously determined values reported in literature [16, 17]. These values were lower than those found by other researchers [18-20].
Unlike equalities of mean is not significant (p = 0.65 threshold) between sites.

In this study, the recorded values for salinity ranged from 0.1 to 0.4 (0.31 ± 0.13) for the site 1, 0.4 to 0.8 (0.6 ± 0.17) for the site 2 and from 0.3 to 0.9 (0.58 ± 0.20) for the site 3. In general, salinity follows the same trends as the electrical conductivity. Thus, salinity was higher in sites 2 and 3 in comparison with site 1 (Figure 5). Unlike equalities mean is not significant (p = 0.18 threshold) from one site to another.

TDS concentrations measured at the three sites varied between 290 and 511 mg/l (440.66 ± 83.64 mg/l) for site 1, between 481 and 772 mg/l (638 ± 122.02 mg/l) for site 2 and between 415 and 841 mg/l (626.5 ± 145.96 mg/l) for the site 3. It seems that the evolution of the concentrations of TDS is similar to that of the conductivity and the salinity (Figure 6). The average values of TDS were lower to the Algerian standard [15]. However, they are superior to those found by others [21, 22]. Unlike equalities mean is not significant (p = 0.13 threshold) between sites.

The results of TSS analysis showed that sewage studied in three sites are characterized by a concentration ranged between 294 and 417 mg/l (352.83 ± 47.90 mg/l) for site 1, between 313 and 364.8 mg/l (340.83 ± 17.21 mg/l) for the site 2 and between 327 and 395 mg/l (369.26 ± 25.71 mg/l) for the site 3. This parameter has a very marked seasonal evolution by reducing values in winter and increases in summer (Figure 7). These values far exceed the concentration limits on the direct discharge which is equal to 50 mg/l [11]. They were similar to those found by Khokh El et al. [23]and were higher than those obtained by Bouslah et al. [8], Hashemi Rachedi and Amarchi [24].
Unlike equalities mean is not significant (p = 0.38 threshold) between sites.
The concentrations of nitrite cancel many times, this is why we have not plotted these spatiotemporal variations. These low concentrations were the results of the rapid transformation of this unstable element by bacteria for nitrate concentrations [20, 23].

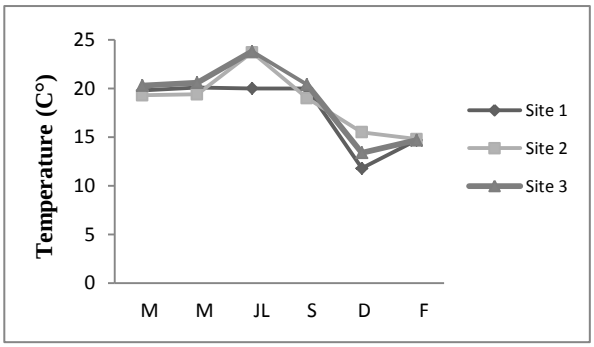

Figure 2. Spatio-temporal variation of the temperature during the study period.

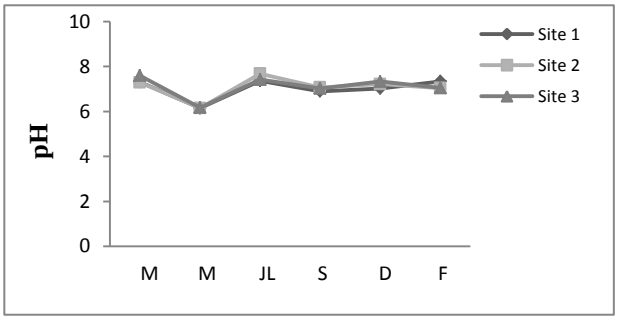

Figure 3. Spatio-temporal variation of the pH during the study period.

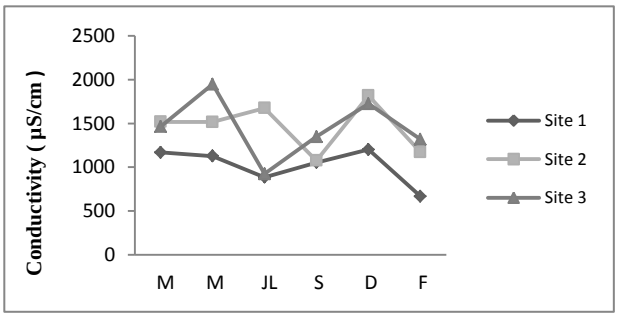

Figure 4. Spatio-temporal variation of the conductivity during the study period.

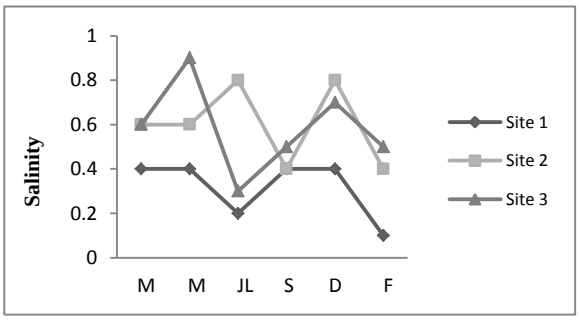

Figure 5. Spatio-temporal variation of the salinity during the study period.

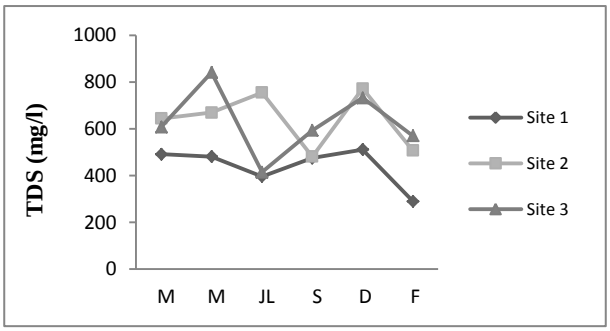

Figure 6. Spatio-temporal variation of the total dissolved solids during the study period.

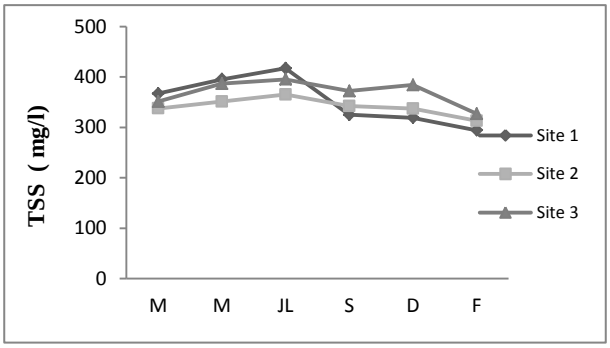

Figure 7. Spatio-temporal variation of the Matter in Suspension during the study period.

The obtained unlike equalities mean concentration in ammonium ion in the site 1 was 2.23 mg/l with extreme values of 0.057 and 4.89 mg/l. It is of the order of 2.36 mg/l with extreme values of 0.17 and 5.61 mg/l for the site 2 and about 1.98 mg/l with extreme values of 0.048 and 4.03 mg/l for the site 3 (Figure 8). Monitoring of ammonium ion concentrations reveals a seasonal pattern which is characterized by a decrease in autumn especially in September and appears to be due to the phenomenon of dilution caused by rain [18] and solar radiation in summer especially in May, which may be explained by the direct influence of the pollution load discharged into the three concentrated sites in ammonium during the summer and due to the high degree of bacterial activity and exceeding the summer assimilation by phytoplankton. The decrease in levels of ammonia nitrogen can have other causes than dilution; which can be converted to nitrate by bacterial action (*Nitrosomonas* sp. and *Nitrobacter* sp.) [25, 26].

Unlike equalities mean is very highly significant (at the p = 0.000) from one site to another.

Nitrate levels in studied waters varied from 0.46 to 2.77 mg/l, with an average concentration of 1.39 mg/l for site 1, between 0.008 and 2.95 mg/l with an average concentration of 0.86 mg/l for the site 2 and between 0.016 and 3.15 mg/l with an average concentration of 1.73 mg/l for site 3. It seems that the very marked seasonal evolution of nitrate is similar to sites 1 and 3; then we stored the inverse of the site 2 this evolution is characterized by a surge in concentration in December (Figure 9).

A comparison of the seasonal evolution of nitrate and ammonium in sites 1 and 3, highlights an opposite evolution of these two parameters, which clearly indicates denitrification [20].

Unlike equalities mean is not significant (p = 0.82 threshold) between sites.

The recorded values of orthophosphate varied between 0.60 and 2.78 mg/l with a mean value of 1.93 mg/l for site 1, between 0.22 and 3.69 mg/l with an average value of 2.77 mg/l for site 2 and between 2.41 and 4.11 mg/l with a mean value of 3.07 mg/l to site 3 (Figure 10). The spatiotemporal evolution of orthophosphate shows a progression in the average from one site to another, these obtained results exceed (2 mg/l), considered as the limit of spilled liquid discharges value into the environment [15]. However, at site 2 we record a diminution in March which is may be the result of the rapid uptake of this component by the bacteria and algae from the environment [27]. Similarly, these results are consistent with the results previously determined by Bordjiba et *al*. [28]. They were less than those found by Boualla et *al* [25], Ghizellaoui and Ghizellaoui [29].

Unlike equalities mean is not significant (p = 0.26 threshold) from one site to another.

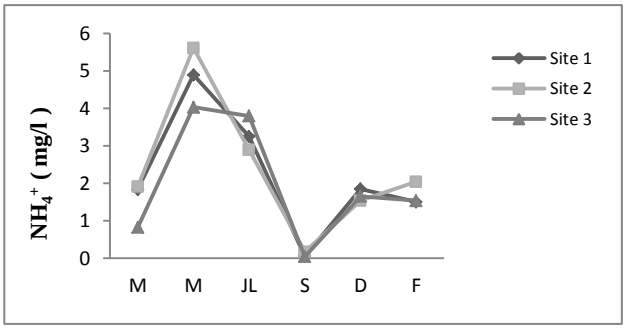

Figure 8. Spatio-temporal variation of ammonium during the study period.

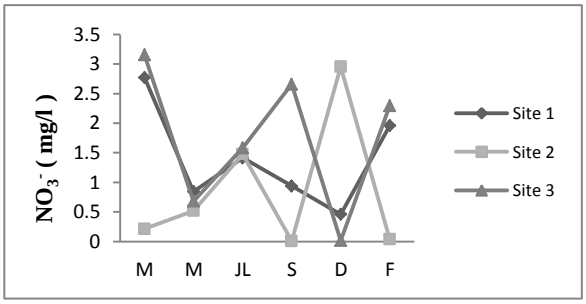

Figure 9. Spatio-temporal variation of nitrates during the study period.

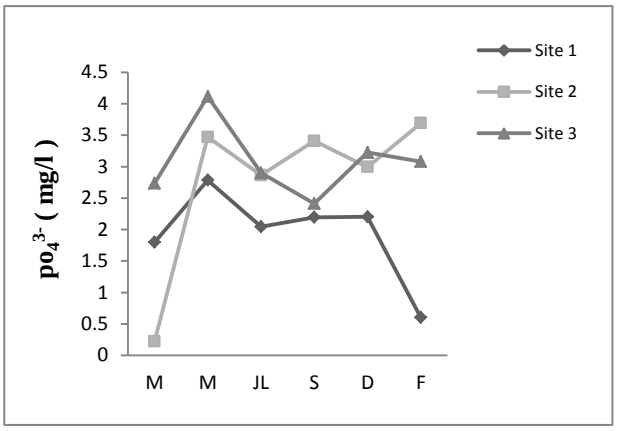

Figure 10. Spatio-temporal variation of Orthophosphates during the study period.

The seasonal evolution of the COD in the three sites is characterized by high annual average concentrations: 298.83 mg/l of O_2, 280 mg/l of O_2 and 295.33 mg/l of O_2, they are clearly superior to the Algerian standard (120 mg/l) [30]. Thus, these values were lower than those obtained by Boutayeb et *al*. [31]and higher than those found by Belghyti et *al*. [32].

Unlike equalities average is significant (at the p = 0.02) between the sites.

Regarding the average values of BOD_5 in the three sites, they were 140.66, 147.16 and 148 mg/l of O_0, respectively. These values were far exceeded the Algerian standard which is equal to 35 mg/l[30]. Similarly, these values were lower with those encountered in wastewater in France [33]. By cons they are superior to those obtained by Sadek et *al*. [13] and consistent with reported values by Ghizellaoui and Ghizellaoui [29].

Unlike equalities mean is significantly high (at the p = 0.000) from one site to another.

In site 2 in the BOD_5/COD ratio is very high with 0.52; that is the general case for discharges loaded with organic matter. This result is confirmed by the important content of oxidizable material, which is of the order of 191.44 mg/l. In addition, the COD/BOD_5 ratio is equal to 1.90 and allows us to infer that the organic load in the sewage of this site is readily biodegradable according to Rodier [9] compared to sites 1 and 3, the COD/BOD_5 ratios were 2.11 and 2, respectively. These reports are available in the interval [2-2.50], which is in accordance to Rodier [9] characterize urban sewage and easily degradable. The annual average ratio BOD_5/COD is of the order of 0.47 for the site 1 and 0.50 for the site 3. This result leads to the conclusion that the sewage of the three sites were polluted by organic pollution which is characterized by partially degradable waste.

TABLE 1. Ratios of the pollution global parameters of wastewaters of Annaba.

Parameters / Sites	**BOD_5/COD**	**COD/BOD_5**	**Oxidizable matter (OM)* (mg/l)**
Site 1	0.47	2.11	193.38
Site 2	0.52	1.90	191.44
Site 3	0.50	2	197.11

*OM = COD +2(BOD_5)/3 [34]

CONCLUSION

Monitoring of the physical chemistry of urban sewage of the city of Annaba including Boukhadra sites and Oued El Bouni Forcha allowed us to identify a set of information at its quality as a direct discharge into the receiving environment. The results of the main physico-chemical parameters (T, pH, EC, NO_2^-, NH_4^+ ....) Found values below the Algerian standards. However, it was noticed a significant concentrations (COD, BOD_5, TSS, PO_4^{-3}) that were superior to the Algerian standard. After the degree evaluation of organic pollution, we can note that all the studied parameters (in particular BOD_5, COD and TSS) put the three sites in the slice of low concentration according to average [35]. Concerning the three releases the COD/BOD_5 ratio characterizes urban domestic and dominant sewage and are also readily biodegradable even if the BOD_5/COD ratio is high, it is confirmed by the great Oxidizable material content. Therefore, the sewage of Boukhadra El Bouni and Oued Forcha play a negative role in pouring on the receiving environment, which allows us to offer to install a pretreatment system in order to put them in standards of accordance direct and indirect discharges in accordance with Algerian standards before discharge.

REFERENCES

1. Bahroun, S., Kherici, H. Bousnoubra, 2011. Evaluation de l'indice de pollution organique dans les eaux naturelles cas de la région d'El Taref (Nord -Est Algérien). Larhyss Journal, 9: 171-178.
2. Balestri, F., R. Moschini, M. Cappiello, A. Del-Corso and U. Mura, 2013. Impact on enzyme activity as a new quality index of wastewater. Journal of environmental management, 117: 76-84.
3. Bennasser, L., M. Fekhaoui, J.L. Benoit-Guyod and G. Merlin, 1997. Influence of tide on water quality of lower Sebou polluted by Gharb plain wastes (Morocco). Water research, 31(4): 859-867.
4. Khattabi, H., É. Belle, P. Servais and L. Aleya, 2007. Variations spatiale et temporelle des abondances bactériennes dans quatre bassins de traitement du lixiviat de la décharge d'Étueffont (Belfort, France). Comptes Rendus Biologies, 330(5): 429-438.
5. Heisler, J., P.M. Glibert, J.M. Burkholder, D.M. Anderson, W. Cochlan, W.C. Dennison, Q. Dortch, C.J. Gobler, C.A. Heil and E. Humphries, 2008. Eutrophication and Harmful Algal Blooms: A Scientific Consensus. Harmful Algae, 8(1): 3-13.

6. Renuka, N., A. Sood, R. Prasanna and A.S. Ahluwalia, 2014. Influence of seasonal variation in water quality on the microalgal diversity of sewage wastewater. South African Journal of Botany, 90: 137-145.
7. El Moustaine, R., A. Chahlaoui, D. Bengoumi, H. Rour E and L. Belghiti, 2013. Qualite De L'eau En Elevage Avicole Dans La Region De Meknes (Maroc) Impact Sur La Sante Et La Production.
8. Bouslah, S., S. Tachi and A. Soufi, 2012. Impact of the Urbain and Industrial Rejection on the Environment≪ Annaba, North-Est Algeria≫. Energy Procedia, 18: 581-586.
9. Rodier, J. and D. L'analyse de l'eau, 9ème Edition, Dunod, 2009, Paris.
10. Dagnelie, P., Statistique théorique et appliquée1998: De Boeck Supérieur.
11. Journal Officiel de la République Algérienne J.O.R.A. 2003. Normes de rejets des effluents industrielles. Art. n° 18 (19 juillet).
12. El Guamri, Y. and D. BELGHYTI, 2006. Etude de la qualité physico-chimique des eaux usées brutes de la commune urbaine de Saknia, rejetées dans le lac Fouarat (Kénitra, Maroc). Journal Africain des Sciences de l'environnement, 1: 53-60.
13. Sadek, S., K. Elkharrim, A. Khadmaoui, M. Guissouss, F.Benelharkati, M. Elmarkhi, Belghyti, D., 2012. Caractérisation physico-chimique des eaux usées de l'hôpital provincial de Sidi Kacem (Maroc). Science Lib Editions Mersenne, 4: 2111-4706.
14. Salama, Y., M. Mountadar, M. Rihani, O. Assobhei, 2012. Evaluation physicochimique et bactériologique des eaux usées brutes de la ville d'El Jadida (Maroc). ScienceLib Editions Mersenne , 4: 2111-4706.
15. Journal Officiel de la République Algérienne J.O.R.A. 1993. Normes de rejets dans le milieu récepteur. Art. n°46 (10 juillet), pp :7-12.
16. Demba, A., M. El Kory, , M.B. El Kory , A. Ould Sid, M., Ibno K.Namr, 2012. Contribution des méthodes d'Analyses statistiques à l'évaluation de la qualité physicochimique des effluents de la STEP utilisés en agriculture dans le périmètre maraîcher du Sebkha (Nouakchott, Mauritanie). Science Lib Editions Mersenne, 4 : 2111-4706.
17. Hassan, R., E. Khadija, D. Belghyti and M. Hadji, 2013. Physico-chemical waste water unit of sugar SUNABEL Mechraa Belksiri. ScienceLib Editions Mersenne, 5.
18. El Mostafa Hassoune, A.B., Y. Koulali And D. Hadarbach, 2006. Effets Des Rejets Liquides Domestiques Et Industriels Sur La Qualité Des Eaux Souterraines Au Nord De La Ville De Settat (Maroc). Bulletin De l'Institut Scientifique, Rabat, (28): 61-71.
19. Mergaoui, L., M. Fekhaoui, D. Bouya, A. Gheït And A. Stambouli, 2003. Qualité des eaux et macrofaune benthique d'un milieu estuarien du Maroc: cas de l'estuaire de Sebou. Bull. Inst. Sci, 25: 67-75.
20. Souiki, L., R. Rouabhi, H. Berrebbah, M.R. Djebar, 2008. Survey of physico-chemical quality of the wastewaters of Biskra city rejected in chaabatRoba, Messdour and wadiZ'ommor (Algeria). African Journal of Environnemental Science and Technologie, 2 (8):231-238.
21. Fadaeifard, F., M. Raissy, M. Faghani, A. Majlesi and G.N. Farahani, 2012. Evaluation of physicochemical parameters of waste water from rainbow trout fish farms and their impacts on water quality of Koohrang stream–Iran. International Journal of Fisheries and Aquaculture, 4(8): 170-177.
22. Traore, A., G. Soro, E.K. Kouadio, B.S. Bamba, M.S. Oga, N. Soro and J. Biemi, 2013. Evaluation des paramètres physiques, chimiques et bactériologiques des eaux d'une lagune tropicale en période d'étiage: la lagune Aghien (Côte d'Ivoire). International Journal of Biological and Chemical Sciences, 6(6): 7048-7058.
23. Khalid, E.K., D. Belghyti, E.K. Khadija, K. Abdelouahed, M. Chentoufi and R. BelghytI, 2011. Caractérisation physicochimique des eaux usées urbaines de la ville de Mechraa Belksiri (Gharb, Maroc). Science Lib Editions Mersenne, 3(110205).
24. Lamia, H. and A. Hocine, 2012. Impact of Urban Waste Water Reject on the Quality of Watercourse "Case of Oued Meboudja EST OF ALGERIA≫. Energy Procedia, 18: 587-593.
25. Boualla, N., A. Benziane, F. Charaoui, 2011. Study of the state of wastewater discharged into the vast sabkha Oran by principal component analysis (ACP). ScienceLib Editions Mersenne , 3 : 2111-4706.
26. Jones, J.G., B. Simon, , R.Mitchel, 1983. Estimates of bacterial growth from changes in uptake rates and biomass. Applied and Environmental Microbioloy, 44:1296-1307.
27. Capblancq, J., A. Dauta, 1990. Spécificités de l'eutrophisation des lacs et des rivières. Adour-Garonne ,45: 20-23. .
28. Bordjiba, O., F. Bekhouche, A. Hassaine and R. Djenidi, 2009. Impact de la pollution par les hydrocarbures sur la qualité des eaux usées dans la région de Skikda (Nord-Est Algérien). European Journal of Scientific Research, 26(1): 87-97.
29. Ghizellaoui, S. and S. Ghizellaoui, 2010. Evaluation of the quality of waters treated by the activated muds station in Oued El Athmania. Desalination, 250(1): 438-443.
30. Journal Officiel de la République Algérienne J.O.R.A. 2006 . Les valeurs limites des paramètres de rejet dans un milieu récepteur. Art. n°26 (23 avril).
31. Boutayeb, M., A. Bouzidi and M. Fekhaoui, Etude de la qualité physico-chimique des eaux usées brutes de cinq villes de la région de la Chaouia–Ouardigha (Maroc).
32. Belghyti, D., Y. El Guamri, G. Ztit, M. Ouahidi, M. Joti, A. Harchrass, H. Amghar, O. Bouchouata, K. El Kharrim and H. Bounouira, 2009. Caractérisation physico-chimique des eaux usées d'abattoir en vue de la mise en œuvre d'un traitement adéquat: cas de Kénitra au Maroc. Afrique Science: Revue Internationale des Sciences et Technologie, 5(2).
33. Mercoiret, L., Qualité des eaux usées domestiques produites par les petites collectivités–Application aux agglomérations d'assainissement inférieures à 2000 Equivalent Habitants, 2009, Rapport Final, Partenariat.
34. Boeglin, J.C., 1999. Pollution industrielle de l'eau: Caractérisation, classification, mesure. Techniques de l'ingénieur. Environnement, 1(G1210): G1210. 1-G1210. 12.
35. Metcalf, E., 2003. Inc., Wastewater Engineering, Treatment and Reuse. New York: McGraw-Hill.

Persian Abstract

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چکیده

موضوع اصلی در مطالعه ی حاضر برآورد کیفیت فیزیکی شیمیایی فاضلاب محلی ناحیه آناباد و پیشنهاد روشی مناسب جهت استفاده مجدد و کاهش گیرنده های مضر از قبیل بوخادرا(سایت ۱)، ال بونی(سایت ۲) و اود فورچا(سایت ۳) است. آنالیزها در طی یک سال (از مارس ۲۰۱۲ تا فوریه ۲۰۱۳) انجام شده است. مقادیر بالای آلایند های ارگانیک در فاضلاب مشخص شد که BOD_5 و COD برای سایت ۱ به ترتیب عبارت از(۲۶/۶۲±۱۴۰/۵۵ میلی گرم بر لیتر از O_2) و (۸۴/۴۰±۲۹۸/۳۳ میلی گرم بر لیتر ازO_2) است در سایت ۲ مقدار COD برابر با (۵۵/۶۷±۲۸۰ میلی گرم بر لیتر ازO_2) و BOD_5 برابر (۳۳/۱۰±۱۴۷/۱۶ میلی گرم بر لیتر ازO_2) و برای سایت ۳ مقدار BOD_5 برابر با(۲۲/۷۱±۱۴۹/۵ میلی گرم بر لیتر ازO_2) و COD برابر با (۱۹/۰۹±۲۸۷/۳۳ میلی گرم بر لیتر ازO_2) بوده است. متوسط سالیانه مجموع جامدات معلق (TSS) در سه سایت به ترتیب برابر با ۳۵۲.۸۳ ، ۳۴۰.۸۳ و ۳۶۹.۲۶ میلی گرم بر لیتر بوده است. داده های گزارش شده بسیار بیشتر از استاندارد الجزایر (۵۰ میلی گرم بر لیتر) است. میانگین سالیانه کسر BOD_5/COD برای سایت های ۱ تا ۳ به ترتیب برابر ۰.۴۷ ، ۰.۵۲ و ۰.۵ بوده است.از این نتایج می توان نتیجه گرفت که سه سایت فاضلاب مورد بررسی به وسیله آلاینده های ارگانیک آلوده شده‌اند که به صورت جزیی قابل تجزیه هستند.