

Quality of the Performance of the Wastewater Treatment Plant in the City of Hoceima, Morocco

Abdelfattah Lakhel, Belala Asmae, Chaouch Abdelaziz

Abstract: Renewable freshwater is a vital resource for life. Today, economic development goes hand in hand with the increase in consumption and the emergence of problems of availability or quality. The wastewater is treated in a wastewater treatment plant (Step) was late to reduce emissions and improve the protection of ecosystem quality. This study is the objective of 'exploring the cleansing station performance. The results show that the station 'Hociema by low load activated sludge allows eliminates about 30 % to 70% for BOD₅. Nevertheless, the chemical oxygen demand is eliminated between 56% and 73%, and the COD/BOD₅ ratio shows the biodegradable nature of the effluents that can be treated by a biological system, ie activated sludge treatment. from the city of Hoceima performing.

Keywords : Hoceima, Renewable freshwater.

I. INTRODUCTION

The contamination of aquatic ecosystems by wastewater is one of the most threatening aspects of pollution in aquatic environments and a global concern in recent years [1]. Indeed, all micro-pollutants can be very dangerous for human health and for other living organisms when they are present in the aquatic biotope at high concentrations [2 ; 3, 4, 5]. Under certain environmental conditions, these trace metals accumulate in natural ecosystems to reach toxic concentrations and cause significant ecological effects.

Currently, wastewater, whether domestic or industrial, are collected by networks of sanitation complex to be treated in a treatment plant before being released into the environment natural. In the station, the treatment varies according to the nature of this wastewater such as natural goontreatment [6, 7, 8 , 9], biological treatment and activated sludge treatment [10, 11]. The present work aims to evaluate treatment efficiency in the activated sludge wastewater treatment plant in the city of Hoceima Morocco.

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II. MEDIUM, MATERIAL AND METHOD

II.1. Medium

General data on the WWTP:

-Location : the STEP is located north of the city on the beach of Cebadilla.

-Commissioning date : 1996 with a nominal flow of 4800 m³/d.

-Rehabilitation and extension date : 2011 with a nominal flow of 9600 m³/d.

-Purification type : Intensive for free culture : activated sludge at low load.

-Station area : The total area of the resort is almost two hectares.

II.2. material and method

- All analyzes and measurements necessary to quantify organic pollutants are standardized according to Moroccan standards, similar to French AFNOR standards according to the techniques recommended by Rodier *et al.*, (2005) [12] .

- The parameters measured in-situ are the pH, the temperature and the electrical conductivity of the water at the entrance and exit of the station twice a month for one year (2017) ; the laboratory parameters analyzed are the demand biochimique in oxygen for 5 days (BOD₅), the demand chimique in oxygen (DCO) and a material in suspension (MES) are carried out in the laboratory ONEP the Hoceima .

- All analyzes statistics was effected by the XLSTAT statistical software

III- RESULTS AND DISCUSSIONS

III-1-temperature

The raw water samples are taken at the pretreatment level and the untreated water samples are taken at the outlet channel level. Figure shows the average values of the input and output of water temperature shows that the value average water treated at the exit of the station of Hoceima meets the standards of WHO.

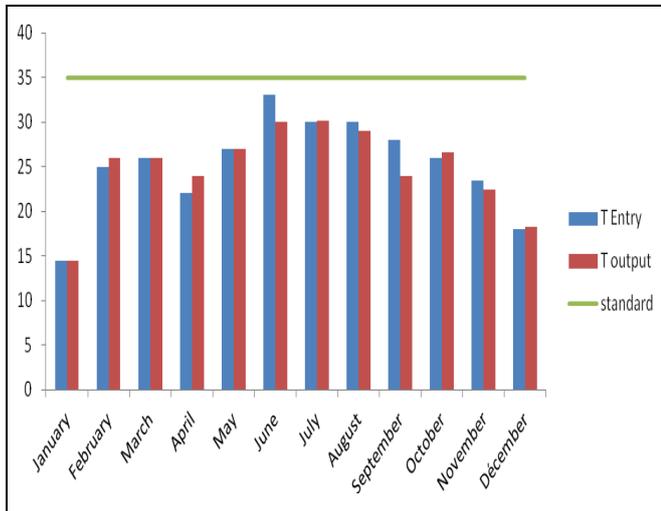


Figure 1: Annual variation in temperature

In general, the measurements obtained from the temperature are in accordance with the requirements of the interministerial decree setting the release limit values for the diversion in the natural environment (Figure 1). The interval (14. 4 and 33) temperature remains suitable for the kinetics and bacterial growth. This result is consistent with three studies [13 ; 14 ; 15, 16].

III-2- Hydrogen potential

The values recorded on the diagram are between 7, 15 and 8, 1 for wastewater. This parameter has no influence on the biological treatment and varies between 7, 43 and 8 for purified water (Figure 2). Average hydrogen potential values remain adequate for bacterial kinetics and growth, and c and water alkalinity status is related to high photosynthetic activity of macrophytes and algae in the environment [15].

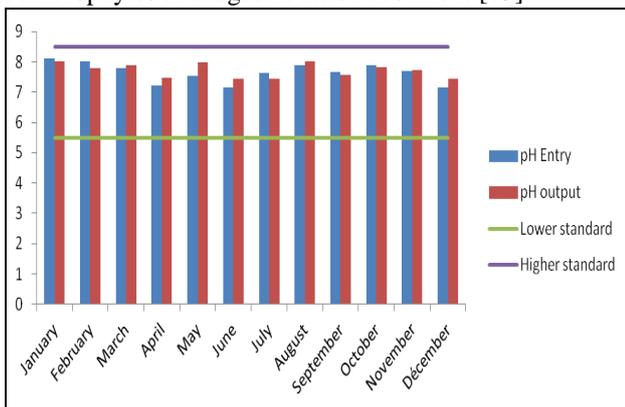


Figure 2: Annual variation of hydrogen potential

III-3- Conductivity

The values of the water conductivity at the inlet of the WWTP are between 510 $\mu\text{s/cm}$ and 3 149 $\mu\text{s/cm}$, whereas for treated water this parameter varies between 575 $\mu\text{s/cm}$ and 954 $\mu\text{s/cm}$ (Figure 3). These values of the conductivity have no influence on the biomass of the biological reactor. These results are different from those found in wastewater from Valencia in Spain [17] , those in Jacksonville [18] and wastewater from the urban municipality of Saknia [19] . They are

also higher than those found by [20] in Yaoundé, Cameroon. But these results are still lower than the Moroccan standards which is fixed at 2700 $\mu\text{s/cm}$.

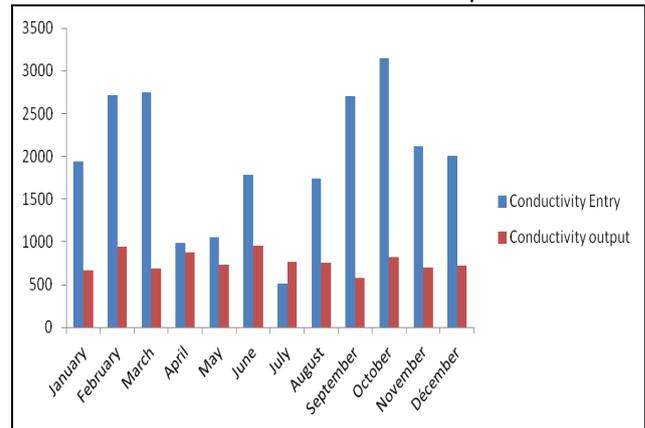


Figure 3: Annual variation in electrical conductivity

III-4- Suspended matter (MES)

The concentration of suspended solids (SS) is generally in the usual range of Moroccan urban wastewater according to SDNAL 1998 (250-500mg/l). At the final discharge level, the figure below shows that the values of the SS concentration are well below the specific discharge limit applicable to the various purified water in the receiving environment. Along the 201 year 7, there were only two average value of TSS concentration in the gross impact that is greater than 500 mg/l (503 mg/l in May and 504 mg/l during the months in November) (4). The average values of the MES are close to those given by El Krati (2000) [21] to Sidi Bennour .

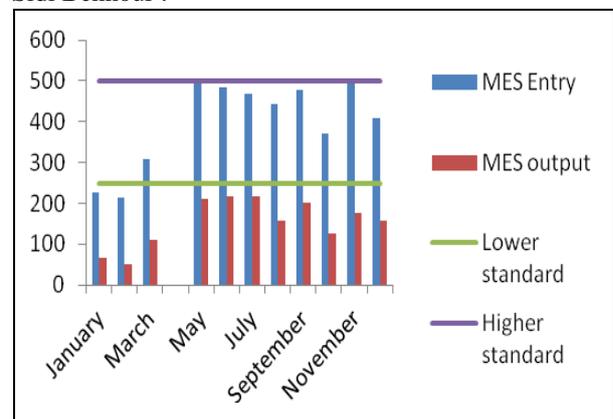


Figure 4 : Annual variation of suspended matter

The suspended particles in the urban wastewater entering the WWTP are treated in this state with a yield of 63.16% . This result shows that the treatment rate of return remains in the yield range of between 30 and 70% (Fig. 5) . Then we can see that the step of the city of Hoceima has an average yield for the MES is the treated water remains in Moroccan standards.

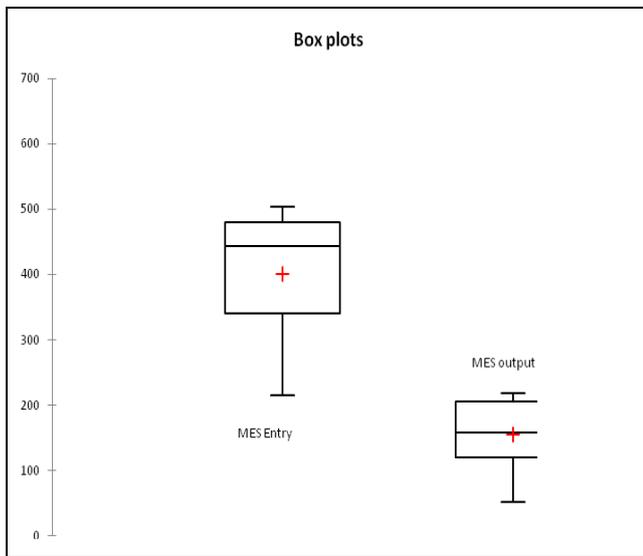


Figure 5 : Rendement of suspended matter

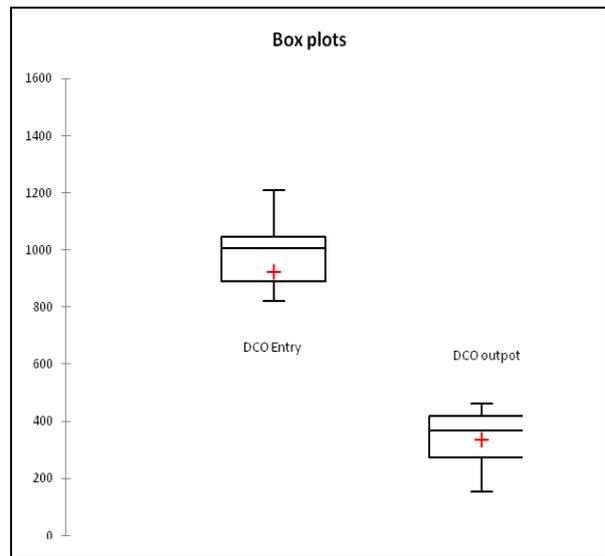


Figure 7: Efficiency of Chemical Oxygen Demand

III-5- Chemical Oxygen Demand (COD)

The COD concentration of effluents at the entrance to the WWTP is significantly higher than the usual range of Moroccan wastewater (500-750 mg/l). On the other hand, the final discharge discharged to the receiving environment complies with the standards in force.

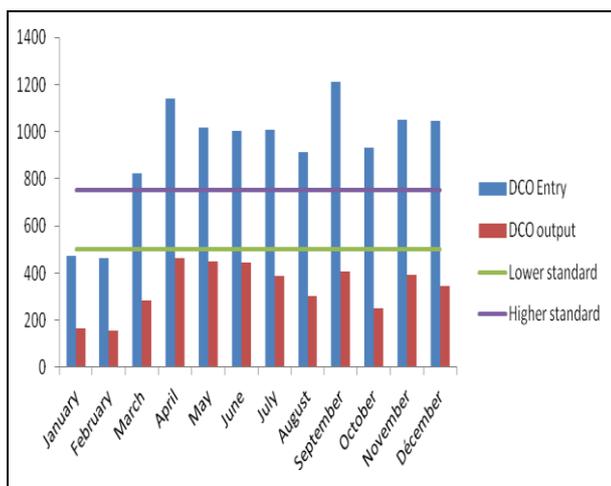


Figure 6: Annual variation of the chemical oxygen demand

Diagram 6 shows that the WWTP receives a chronic overload of organic pollution (COD). Similarly, the COD values found are consistent with the nationally observed mean values, they are significantly higher than those obtained by El Guamri & Belghyti (2006) Kenitra [19] and found by Sonnenberg & Holmes (1998) in Valencia, Spain [17]. The chemical oxygen demand treatment rate of return varies between 56% and 73% (Figure 7) remains in the average range of treatment. So we can conclude that the treatment of urban waste water from the town of Hoceima respect the norms of compliance of rejection s, and meet the legal requirements and the effectiveness of treatment.

III-6 Biochemical Oxygen Demand (BOD₅)

Incoming raw effluent to the WWTP are overloaded BOD₅ which is generally above the usual range of Moroccan waste (200-400mg/l) with an average 478,3mg O₂/L. But at the level of the final discharge, the concentration of BOD₅ is well below Moroccan standards with an average value of 149.08 mg O₂/L (Figure 8).

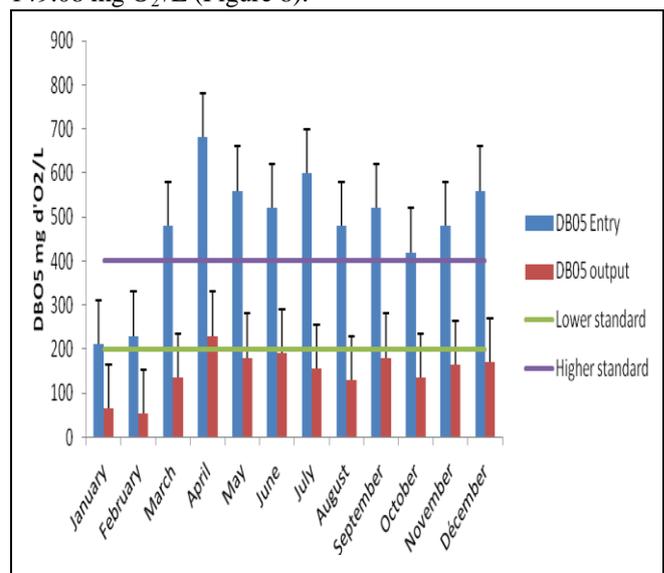


Figure 8 : Annual variation of biological oxygen demand

The sewage treatment has roundly average of 69.25% this results shows that the processing rate of return remains in the range of r e turn between 30 and 70 % . Then it can be seen that the Hoceima WWTP has an average yield for BOD₅, but remains high compared to those found by Ekweozor et al. (2001) in Nigeria[22], Endamana et al. (2003) in Cameroon [20] and El Guamri & Belghyti (2006) in marocoo [19].

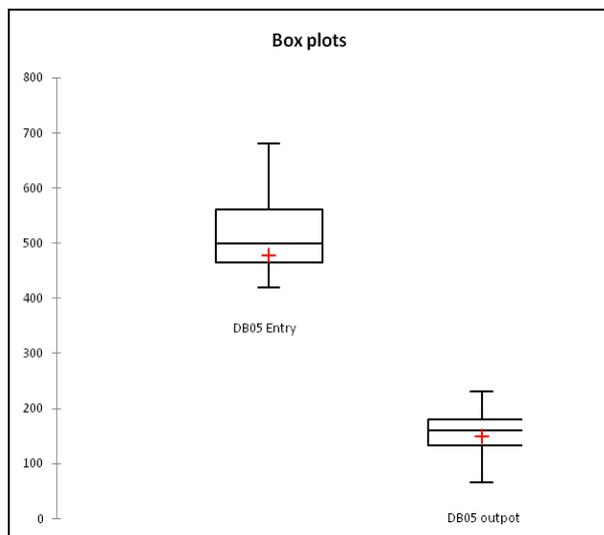


Figure 9: Efficiency of biological oxygen demand

IV. CONCLUSION

The ratio COD / BOD₅ gives an indication of the origin of the organic pollution. Thus, the average of this ratio at the level of the effluent entering the WWTP is 1.6 which is less than 3 (domestic urban effluent with better biodegradability), which shows that the wastewater treatment plant in the city of Hoceima is performance and meet the requirement of Moroccan standard.

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