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Research Article

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Concentration study level of nitrogen and mineral phosphorus eutrophication and impact of the mouth of Wadi El-Kebir East (W.EL-TARF)

Salha Guergueb[1*], Aziz Laifa[1], Rachid Djamai[1] and Djamel Fadel[2]

[1]*Laboratory of Plant Biology and Environmental, Department of Biology, Faculty of Science, University Badji Mokhtar of Annaba, Algeria*
[2]*Laboratory of Aquatic and Terrestrial Ecosystems, University of Souk Ahras, Algeria*

ABSTRACT

The massive introduction of organic matter and nutrients (nitrogen, phosphorus) in surface water disrupts the natural balance of aquatic ecosystems. These contributions are mainly due to direct discharge of effluents (domestic, industrial and agricultural), the flow of contaminated runoff after passing on of agricultural land and non-agricultural, and to a lesser extent, the impact atmospheric. The most visible manifestation of this type of pollution is the eutrophication of rivers and standing water. Data on water quality of the wadi Kebir East (East of Algeria) and the characteristics of the sources of degradation are few. In this context, the main objective of this work is to diagnose eutrophication of Oued El-Kebir, this purpose we followed physicochemical analyzes of the levels of nutrients such as nitrogen and phosphorus and other interpretive parameters in the waters of this river. The test results showed levels of nitrate ion, ammonium ion and phosphate ion are below values may cause the eutrophication at least in the sequence of the rivers during the period of analyzes

Key words: physico-chemical analysis, Oued El-Kebir, pollution, eutrophication, feed, Nitrogen, Phosphorus.

INTRODUCTION

First mineral resource of the world and the value of water is priceless increasingly rare and endangered, protection and management of this natural element is essential for the survival of humanity, animal and plant kingdom [1]. water is an indispensable resource for life. It deserves special attention, since it is highly altered and seriously threatened by human activities. Indeed, population grows in rapid urbanization causes many disturbances to the natural environment [2] The accelerated increase in the contamination of aquatic systems in recent years and the gradual change in the nature of pollution, which are becoming more and more chemical and short- or long-term toxic, have made the determination of the quality of water one of the daily tasks of enforcement agencies and one of the main concerns of hydro-ecological research.

Eutrophication of lakes and reservoirs is among the most widespread water pollution parameters. Over the past 20 years, the term "eutrophication" was used to describe the enrichment of water by artificial and undesirable intake of nutrients promoting plant development [3] .The phosphate and ammonium are two chemicals often found in aquatic environments as a result of urban waste, industrial and agricultural and also by the effect of biological reactions.

In Algeria, the surface water quality deteriorates in pools of vital importance as a result of discharges of urban and industrial waste [4] .The main objective of this work is to diagnose eutrophication of Oued El-Kebir located North East of Algeria in the region ELTarf. For this purpose we followed physicochemical analyzes of the levels of nutrients such as nitrogen and phosphorus and other interpretive parameters in the waters of this river.

EXPERIMENTAL SECTION

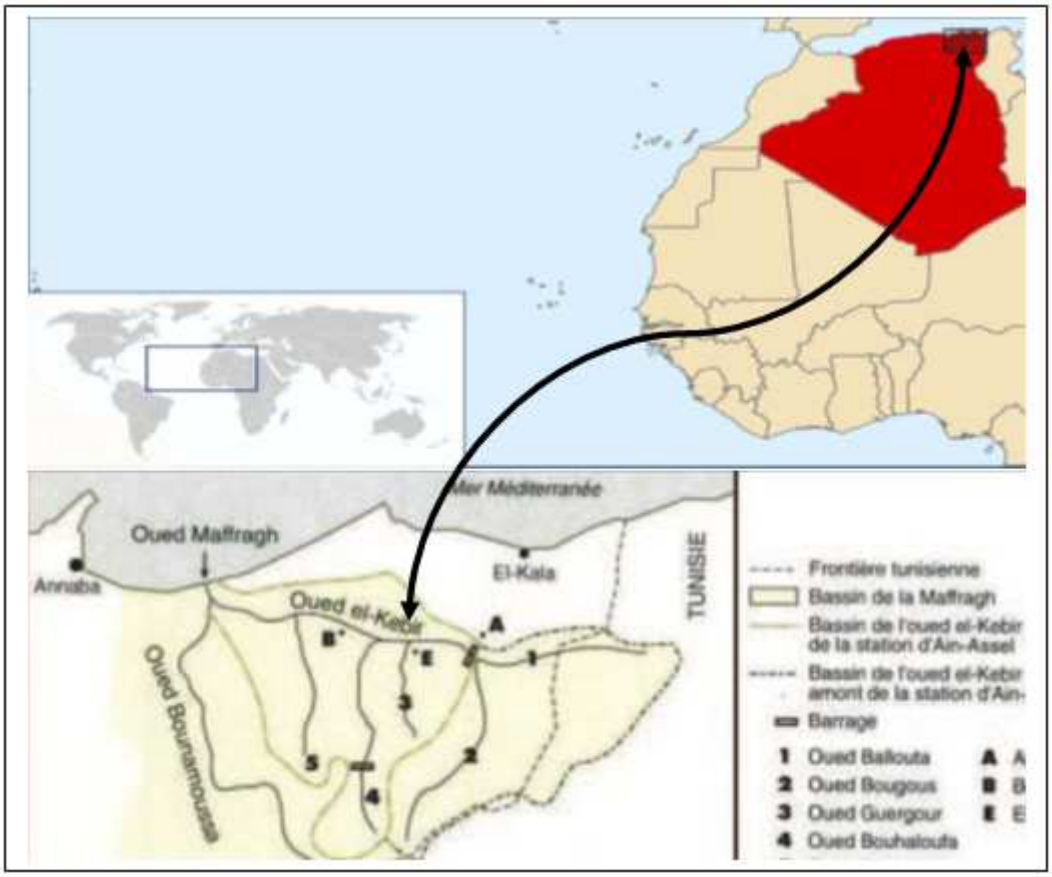
Choice of sampling point

The collection of a water sample is a delicate operation that must be uniform and representative obtained without modifying the physicochemical characteristics of the water [5].

The 12 samples are taken using a bridge is the easiest way to access the center of the stream, it is recommended to rinse three times with water from the river before taking the 'sample, a few cm below the surface, was using a tub of plastic liter bottles of 1.5 after 3 rinses were filled with water to be taken for all new samples, water is taken in the wafer surface water, about 50 cm thick. The bottles are rinsed with distilled water .In order to eliminate any trace of contaminant. They were then stored at 4 ° C during transport to the laboratory, the analysis is done on the same day in any case beyond 24 hours.

Methods of analysis of various parameters (Table 1)

parameter	Analysis Methods	units
pH	pH meter type HORIBAL-PG7730	
conductivity	Type conductivity meter (HANNA instrument HI 8733) calibrated with H2SO4 solution (0.01N) and KCl (1N).	microseconds/ cm
oxydability	Potassium permanganate methods [5]	Mg / l
nitrate	Spectrophotometric methods [6]	Mg / l
nitrite	Spectrophotometric methods [6]	Mg / l
ammonium	Nessler method [7]	Mg / l
phosphate	Spectrophotometric methods [6]	Mg / l



Geographical location of the watershed of Oued EL-Kebir

EXPERIMENTAL SECTION

Study area

Kebir The watershed is included, about 50% in each of the two neighboring countries: Algeria and Tunisia. The watershed of Oued EL- Kebir East is a sub-basin of El Oued EL- Kebir. It is controlled by a gauging station upstream of its confluence with Oued Bounamoussa. Due to the existence of two wadis named El Oued EL-Kebir (Skikda region and the region of Annaba El-Kala), belonging to Constantine coastal basins.

The National Agency of Water Resources (ANRH) has assigned the name of Oued EL- Kebir to this basin. This basin is located upstream of the town of Ain Assel. It is adjacent to Constantine coastal slopes and form the northern slopes of the final section of the northern chain of the Tell Atlas. His plain, formed by the union of three major wadis (Kebir, Ballauta, Bougous) drains the slopes of Kroumerie mountains and receives in its middle valley, many tributaries on its left bank: Guergour, Bouhaloufa and Boulathan (Fig. 1).

The watershed of Oued EL- Kebir East covers a longitude between 7 ° 58 '8 ° 35', latitude 36 ° 30 'to 36 ° 55'. It occupies an area of 681.33 square kilometers and encompasses the municipalities of: Bouteldja, El Taref, bougous, Chaffia, Ain Assel, Ain Kerma, Souk El Roum,Lac des Oiseaux, Berrihane and also Ain Drahem Fernana and Tunisia.

RESULTS AND DISCUSSION

The results of this study are exposed to discuss the parameters measured, including in situ measurements and those made in the laboratory.

Potential Hydrogen (pH)

buffer system developed by carbonates and bicarbonates. It depends on the diffusion of carbon dioxide from the atmosphere, the balance sheet of respiratory and photosynthetic metabolism[8], the observed values has Oued El Kebir East indicate that the pH is slightly neutral to alkaline in all seasons has a maximum value of 7.80 in winter and minimum average of 7.11 and 6.65, the pH acidity in dry periods (autumn and summer) can be explained by the abundance of CO2 dissolved in water during the low water period [9]& [10] This small variation is due to the buffering effect of bicarbonate ions.

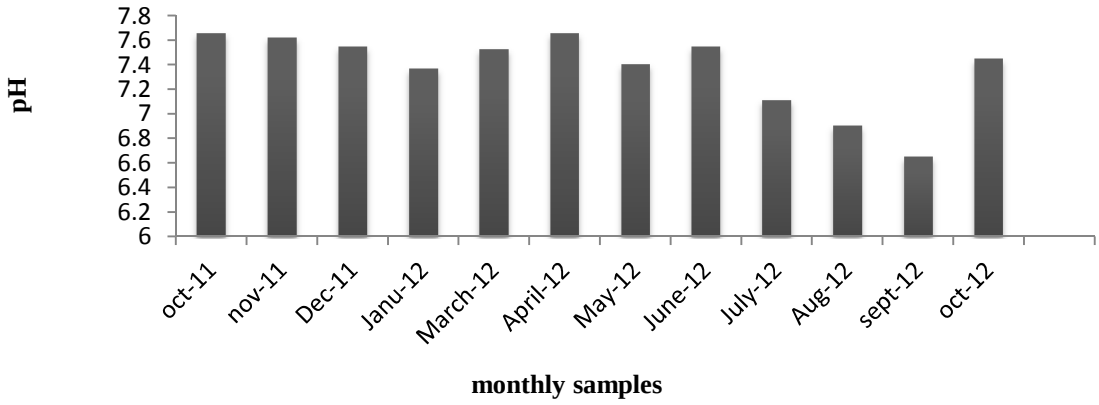


Figure 2. pH of the waters of the wadi EL-KEBIR EAST

Electrical conductivity (EC)

The temporal distribution of the electrical conductivity of the studied waters shows a decrease in the rainy period, the explanation for this decrease is the dilution water by the contribution of rainwater. high conductivities corresponding to a major water mineralization located along the main course of the Oued El Kebir East;Wadi Boulathane and Zitoun, these waters across the plains of El Tarf and Bouthaldja, winter floods causes episodes a decrease in conductivity , [11] &[12] , thus[12] instructed naturally minerals from the leakance highly mineralized groundwater, [13] &[14]

At swallows, changes in conductivity are highly related to those of the tide can be explained by ion enrichment (chlorides) appreciable water which consequently influence the values of the mineralization

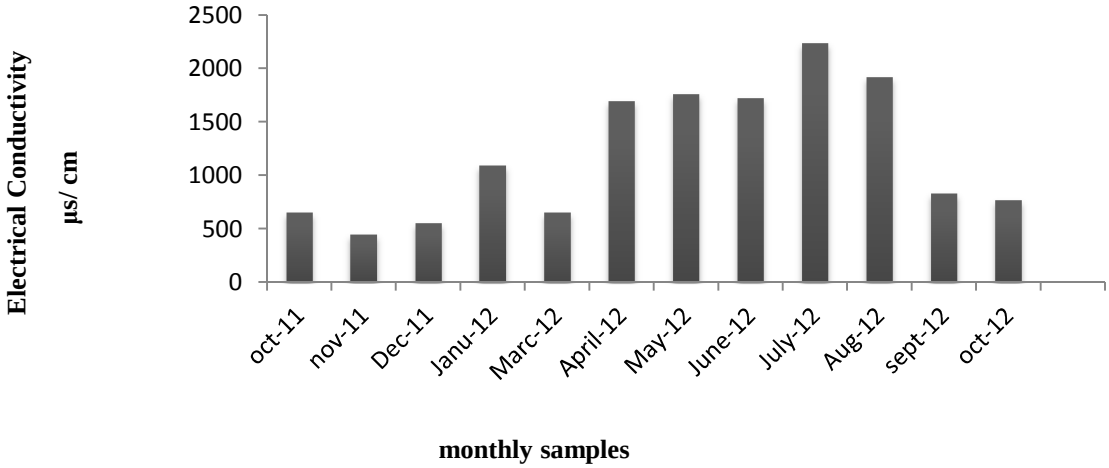


Figure3. EC values of the sampled water

The oxidability

Oxygen is one of the fundamentals of life. It accounts for 21% in the composition of atmospheric air, and represents about 35% of dissolved gas in water at normal pressure [15]. Oxygen is a particularly useful parameter for water and is an excellent indicator of quality. Its presence in surface water plays an important role in the self-purification and keeps the aquatic life [16].

The permanganate oxidizability is an indicative measure, which allows only a relative assessment of the quality of an organic water [17].

Our results show that the values of the oxidizability waters of the Oued El-Kebir East are on average 1.37 mg O_2 / l ranging up to 2.6mg O_2 /l to a minimum of 0,3 mg O_2 / l. These results have the interest indicator of the amount oxidizable organic materials.

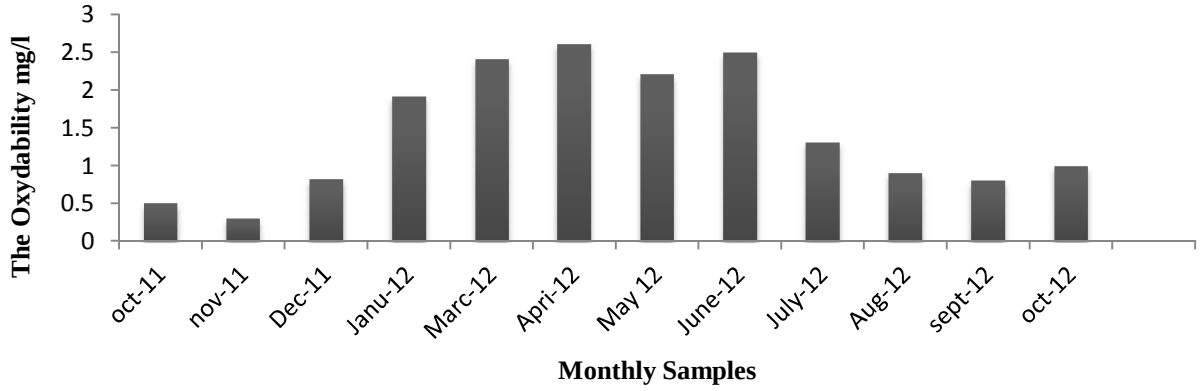


Figure 4. Oxidability values of the samples water

Nitrogen compounds

Nitrogen is an essential element in the building of the living cell. It is used as a major indicator of organic pollution. It comes in two forms: organic (proteins, amino acids, etc.) and inorganic (ammonium, nitrite, nitrate, etc.) Nitrogen forms studied are: ammonia nitrogen (NH^{4+}) and nitrate ($N0_3^-$) and ($NO_{2)}$ nitrite.

Nitrate (NO_3^-)

Nitrates constitute the final stage of oxidation of the nitrogen and represents the form of nitrogen in the higher oxidation state in the water. [18]. (We can conclude that nitrate levels recorded in the Oued El Kebir East surface water are lower than the level suggested by international standards (50 mg /l). Indicating that the studied waters are not subject to the risk of nitrate pollution.

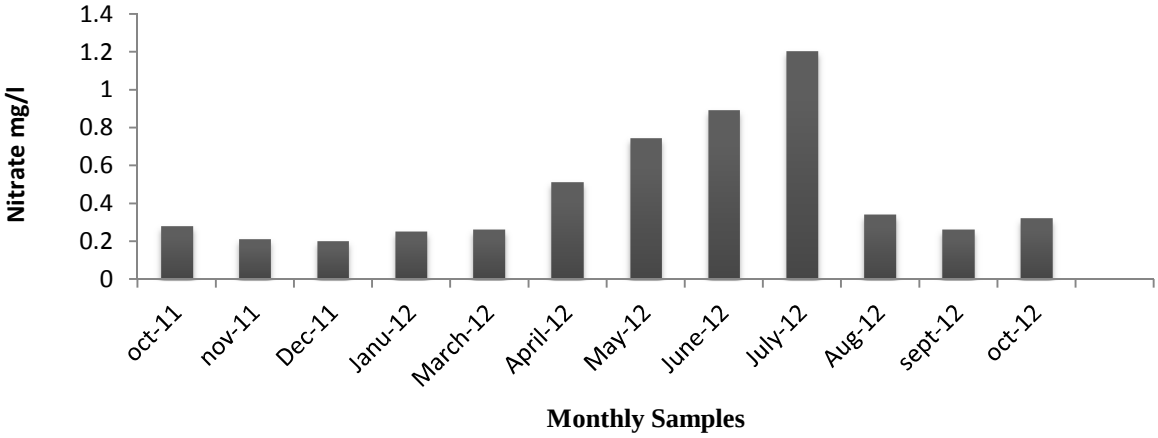


Figure 5.Nitrate levels in the water samples studied

Nitrite (NO_2)

Nitrites may be present in the water but at low doses. They come either from incomplete oxidation of ammonia or of a nitrate reduction under the influence of a denitrifying action. The results of the nitrites obtained in the surface waters of the Oued El Kebir East are 0.05 mg / l to 0.7 mg / l. These levels are in accordance with the international standard 0.1 to 1 mg / l.

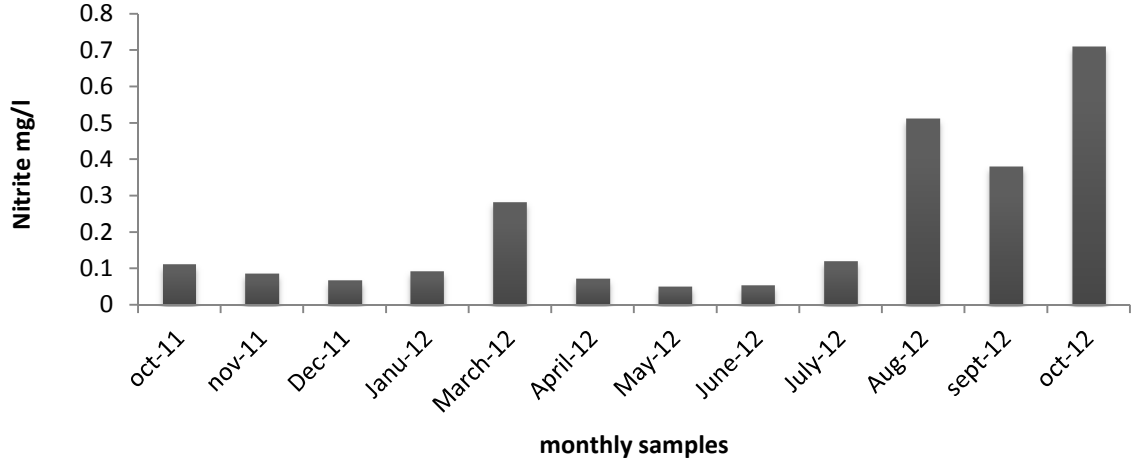


Figure 6. Nitrite levels in the water samples studied

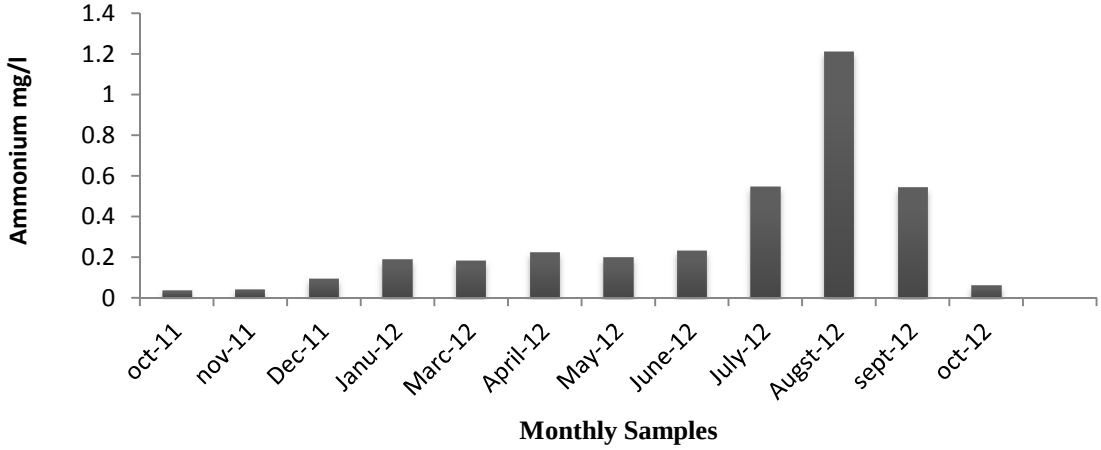


Figure 7. Ammonium levels in the water samples studied

Ammonium (NH4 +)

Ammonia nitrogen is one of the links of the complex nitrogen cycle in its original state. It is a good indicator of river pollution from urban effluents. In surface waters, it comes from the nitrogenous organic matter and gas exchange between water and the atmosphere[19]..

The ammonium found in wet period values are lower than those of the dry period the relatively high levels recorded during dry periods reflect the incomplete process of degradation of organic matter. The high values ammonium ions in the waters of the Oued El Kebir East it possible to place these waters in the medium class quality according to international quality grid surface water.

Phosphorus (PO_4^{-3})

Phosphorus, an important nutrient, can be in various oxidized forms .Elevated levels of this element in surface waters can cause eutrophication [1]., the PO_4^{-3} phosphorus concentration in Oued El-Kebir East surface water remain below the international standard. These values are then used to classify these waters in the middle class.

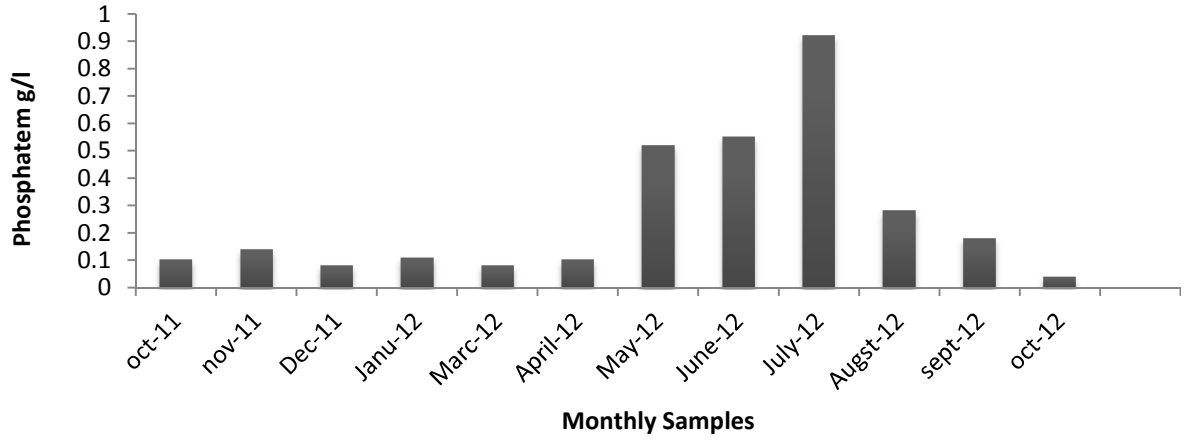


Figure 8. Phosphorus levels in the water samples studied

CONCLUSION

This work is conducted in order to make a diagnosis of the physicochemical state of water surfaces in the region of El-Tarf (Oued El-Kebir East), measurements of toxic substances pesticides and metals were excluded from our study because of the absence of industries in the study area, the component analysis showed a seasonal variation in the physicochemical composition of these waters results can be explained by a slight increase in monthly rainfall during the study year 2011/2012 resulted in floods that affected the wilaya of El Tarf, these results show that the studied parameters are then used to classify these waters in the middle class grid according to international quality surface water.

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