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Abstract

My ongoing Master's Thesis Project seeks to study the feasibility of reusing the treated wastewater (domestic wastewater) from a treatment plant, for agricultural purposes as an adaptation measure to climate change in Ain Temouchent, an arid region located in North Western Algeria. To achieve this, the specific objectives are: to analyse the physico-chemical and biological parameters of the water produced from the treatment plant, to make the comparison with the required standards of water reuse for irrigation and to see the possibility of the implementation of an irrigation project in the region. A study is currently being carried out in the wastewater treatment plant of the region, in order to be aware about the eventual problems encountered in such kind of project. From the obtained results, some recommendations will be done for a better progress of the project, leading to a better integrated water resources management of the region in the context of climate change.

Introduction

Access to adequate water supply is essential for a sustainable development. On a global basis, fresh water is an increasingly scarce resource. It is partially caused by increasing population coupled by change of consumption pattern and climate changes. Climate change has the potential to impose additional pressures on water availability and water demand in Africa (Bates, et al., 2008). Also, due to rapidly population growth, water demand is expected to increase in the coming years. Several countries in Africa and Middle East, which has one of the world's highest population growth rates, face water shortages. Globally, agriculture accounts for about 70% of all water consumption compared to 20% for industry and 10% for domestic use. In Algeria, agriculture is facing more and more serious problems in irrigation. Water intended for this purpose is almost rare and the application of adequate solutions is essential to cope with climate change. IPCC (Intergovernmental Panel on Climate Change) defines climate change adaptation as "an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities". Wastewater should no longer be considered as a problem, but rather as a solution to the challenges faced by water resources, mainly the climate change. Treated wastewater are significant water resources and can constitute a solution to reduce the intensive exploitation of water resources. Water reuse can be considered as an adaptation measure to preserve water resources through the reuse by man for uses not intended for consumption, such as irrigation, industry.

Materials and Methods

Ain Temouchent is an arid region located on the western coastline of Algeria. It is limited by: The Mediterranean sea to the North, the city of Sidi Bel Abbes to the South, the city of Oran to the West, the city of Tlemcen to the South-East. The wastewater treatment plant of Ain Temouchent activated sludge type and low load is implemented on a site of 6 hectares. It receives all the wastewater from the city of Ain Temouchent. The wastewater treatment plant started to operate in January 2014. The daily flow rate of the plant is about 11000 cubic meter / day. In order to assess the possibility of treated wastewater reuse for agricultural purposes, a series of analyzes of the pollution parameters of the treated wastewater were carried out.

- Temperature
- PH
- Total Suspended solids
- Conductivity (µs/cm)
- Turbidity(FTU)
- Dissolved oxygen
- Chemical oxygen demand (mg O2/l)
- Biological oxygen demand at 5 days (mg O2/l)
- Total phosphorus (mg/l)
- Total Nitrogen (mg/l)
- Nitrates (mg/l)
- Nitrites (mg/l)
- Ammonia nitrogen (mg/l)
- Phosphate (mg/l)

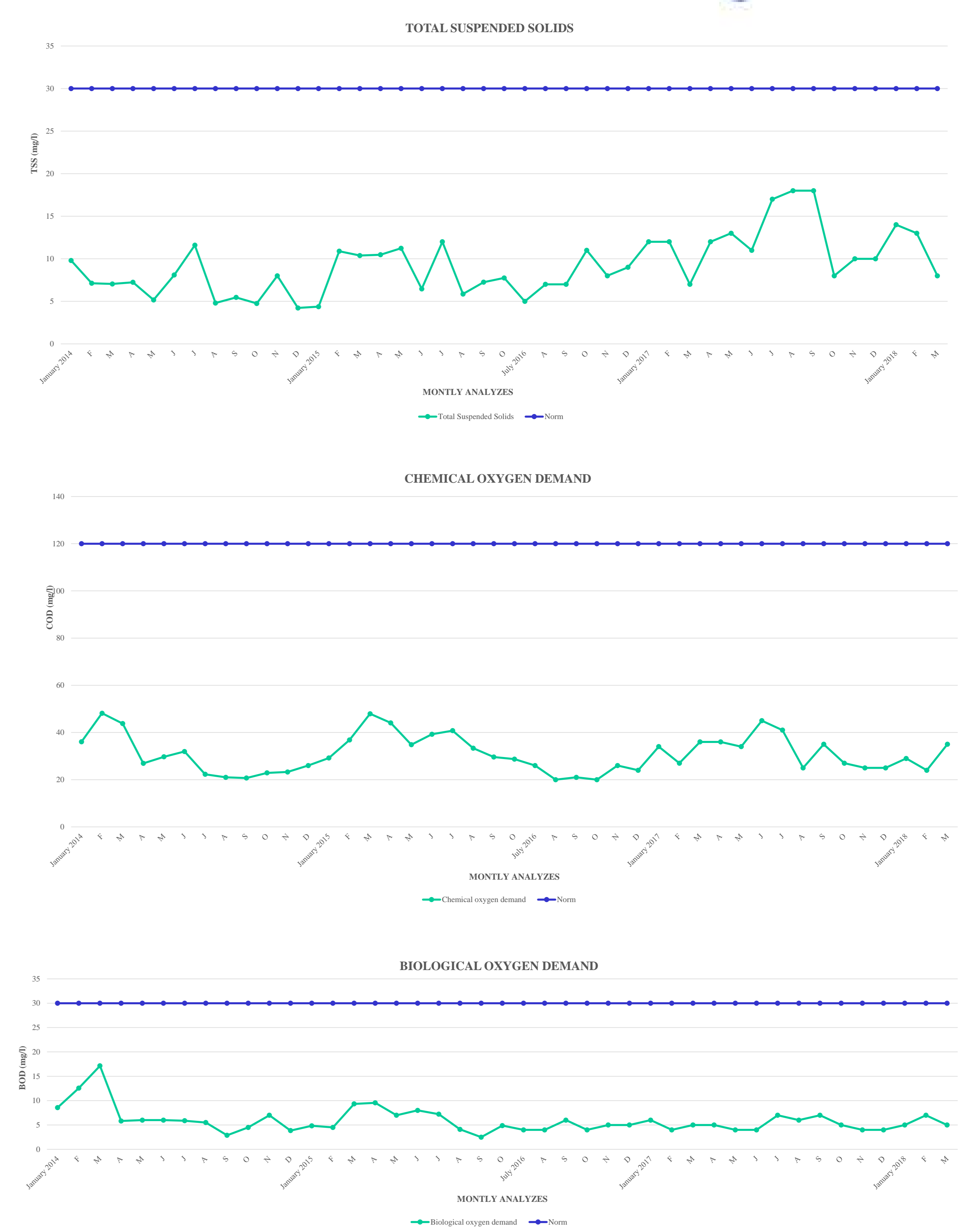
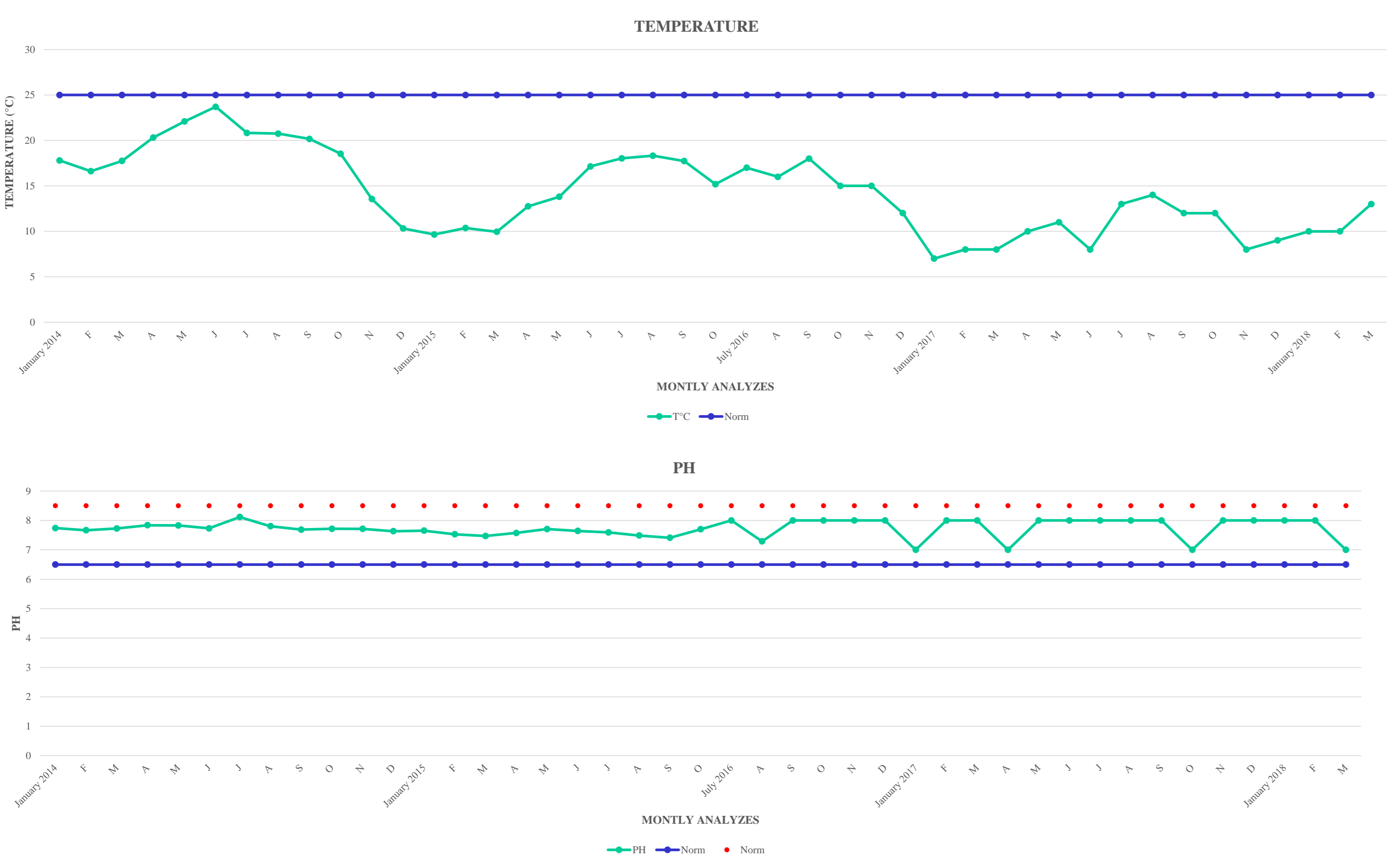
These are the measurement of some parameters



Temperature-PH-Conductivity Total Suspended Solids Chemical Oxygen Demand Biological Oxygen Demand

Results

These following figures represent the variation of the differents parameters from 2014 to 2018



Discussion

- The variation of the temperature from 2014 to 2018 ranges between 7°C to 23.7°C. These values are below the recommended limit of water for irrigation fixed by the Algerian Norm (T=25°C).
- The variation of the PH from 2014 to 2018 ranges between 7 to 8.1. These values are in the range of recommended value of water for irrigation fixed by the Algerian Norm (6.5 to 8.5).
- The variation of the total suspended solids from 2014 to 2018 ranges between 4.22mg/l to 18mg/l. These values are less than the limited value fixed by the Algerian Norm equals to 30mg/l.
- The variation of the chemical oxygen demand from 2014 to 2018 ranges between 20mg/l to 48.16mg/l. These values are less than the limited value fixed by the Algerian Norm equals to 90mg/l.
- The variation of the biological oxygen demand from 2014 to 2018 ranges between 2.5mg/l to 17.14mg/l. These values are less than the limited value fixed by the Algerian Norm equals to 30mg/l.

Conclusion

According to the results of the analyzes obtained, it can be concluded that the treated wastewater from the wastewater treatment plant of Ain Temouchent can be used for irrigation. Implementing an irrigation project in the region will be of an economic interest to farmers as well as water resources managers. Reusing treated wastewater in irrigation is also an adaptation measure of the region's water resources facing climate change.

References

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Acknowledgement

I would like to acknowledge the following people for their efforts and contribution to the supervision of my ongoing Master's Thesis Project. My supervisors Dr Nadia Badr and Dr Abdelbaki Chérifa. My Deepest gratitude goes to Dr Halima Belarbi for her support. I also would like to thank the staff of the wastewater treatment plant of Ain Temouchent for the current internship opportunity. I want to thank all the staff members of the Pan African University Institute of Water and Energy Sciences (Including Climate Change) PAUWES in Tlemcen, Algeria.