

Abstract

The present study aims to investigate the impacts of the quality of preliminarily-treated, sanitation and wastewater on the hybrid treatment system that consists of CW and SAT as a filtering system from various disease, pollutants in order to satisfy the Palestinian standards related to wastewater treatment.

In addition, this study looks into the potentials of pollutants concentration reduction, and effects of wastewater quality on the performance a CW-SAT hybrid system. This technology able to improve wastewater treatment and feeding aquifers since they are not costly and can be applied easily.

The hybrid treatment system (CW-SAT), that consists of two successive systems to treat wastewater by using CWs with SAT system as a filtering system to purify wastewater from pollutants, disease and suspended solid materials, involves several physical and biochemical processes, and mainly based on operating conditions, the site, and the sources of polluted water. The technologies of wetlands and the vertical filtering system by soil are used in many countries to treat polluted water.

Three identical systems of (CW-SAT) have been constructed with similar operating conditions at the same time and locations. Samples were taken from three different sources:(I) secondary effluent from a contact process activated sludge serving of (BZU) treatment plant (around 10,000 person); (II) tertiary treated effluent of Al-Bireh municipal wastewater treatment plant (around 50,000 person) and (III) influent wastewater of Al- Bireh (Raw-after grit). The CW system was supplied with ventilation source and gravels with 42% pores. In every CW, about 12 – 18 reed plants were planted. Samples were collected from this system and supplied to the aquifer treatment system 0.85 – 1.18 mm sand posts.

The samples were collected and analyzed from both the influent and effluent of the CW, and the vertical filtering system by using sand with certain specifications under constant climatic and operating conditions at the same time and location.

After 40 days of the operation which is called the ripening and maturation, the hybrid system was observed and followed up by testing and analyzing all the pollutants for a period of approximately 200 days. The study was divided into two stages: the operation stage and steady state stage.

The importance of this study, lies in the finding that the hybrid system has the capability of treating various types of wastewater pre-treatment. By this application, it was found out that there was a significant decrease in the concentrations of the following pollutants: BOD₅, COD, NO₃-N, NH₄-N, TSS, and FC bacteria. The final outcomes of the decrease in the pollutants concentrations that were obtained from the hybrid system for wastewater treatment of raw, treated wastewater of Al-Bireh Plant and the BZU were as follows: COD (89.9, 76.9, 79.9%); BOD₅ (89.7, 71.9, 91.3%); NH₄-N (94.4, 92.4, 95.4%); NO₃-N (92, 99.3, 95.3%); TSS(90, 99.6, 91.5%); and FC (99, 99.6, 98.6%), respectively.

The study reached remarkable findings in treating wastewater from different sources by using the hybrid system that satisfy the requirements of the Palestinian standards for the concentrations of each of the COD, BOD₅, NH₄, NO₃, TSS and FC.

Therefore, a CW-SAT hybrid system has achieved much better results than using CW or SAT system.