

# Abstract

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## **Comparative Study to Assess the Performance of an Integrated Treatment System Using ANN vs. GPS\_X**

Competent operation of wastewater treatment plants (WWTPs) is highly required to assure producing an effluent quality that complies with the regulations for each state. However this process requires various changes which could be difficult to implement over a short duration when a plant is subject to sudden changes in the influent loads. Hence, simulating tools become efficient at this point to guide the operators to make prompt decisions. Artificial Neural Networks is one of those fast simulating tools which has demonstrated promising results in analyzing the performance of WWTPs. It was used in this study to predict the percentage removal rate achieved by an experimental set up which consists of an anaerobic/aerobic hybrid system to treat domestic wastewater and which was simulated via GPS\_X. This simulation was done to test the performance of the system when subject to different influent organic loads, discharge rates while have different surface area for the attached media. There were 66 scenarios performed, 53 of which were trained and 13 were tested using ANN. Most percentage removal rate difference values were in the range of 0% to 6 % for BOD<sub>5</sub>, 0-5% for COD, 0-2% for TSS, 0 – 20 % for TKN and 0 – 10 % TP. Consequently ANN could be a reliable tool to estimate best operating conditions required when a WWTP is subject to any external changes compared to the actual design values.