INVESTIGATIONS OF EFFLUENT QUALITY OF CHA-AM MUNICIPALITY WASTEWATER TREATMENT PONDS SYSTEM

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ABSTRACT

This study aimed at investigating the effluent quality and evaluating the efficiency of the current treatment system in terms of pollutants reduction in the Cha-Am municipality wastewater treatment ponds system that receives and treats municipal wastewater and runoff from the seaside resort town of Cha-Am, Thailand. The main components of the treatment system include aeration pond, sedimentation pond and extended aeration pond. The final component of the system is an evaporation pond, which is part of a pre-existing natural wetland.

Grab water samples were collected near the water surface from six locations in the pond system: influent chamber, inlet of aeration pond, outlet of aeration pond, at the opposite side of the inlet of sedimentation pond, outlet of extended aeration pond and outlet of evaporation pond during 19 July to 12 September 2015. The target pollutants investigated in grab samples included: chemical oxygen demand (COD), total suspended solids (TSS), total Kjeldahl nitrogen (TKN), volatile suspended solid (VSS) and *Esherichia* coli (E.coli) using standard methods (APHA) and Coliscan Easygel technique. Average treatment efficiency for E.coli (99.99%) and TKN (83.18%) were quite good. The system was less effective in reducing TSS (24.64%), COD (18.95%) and VSS (47.96%). However, the incoming raw wastewater levels of TSS, VSS and COD already were low.

Two YSI 6920 datasondes were deployed near the inlet of the aeration pond (P1-inlet) and at the opposite side of the inlet of sedimentation pond to monitor dissolved oxygen (DO), conductivity, pH, turbidity and temperature at 30 minute time intervals from 19 June to 12 September 2015. The data were averaged on a daily basis and it was found that an Autoregressive, Moving Average model of order 1 (ARIMA 1,1) provided an acceptable fit to the time series. This suggested that the system "memory" is strongest for one day. Suggestions to improve treatment efficiency include adjusting aerator operation, but generally the system is functioning well and cost-effectively.

To enhance the treatment efficiency and improve ecosystem service value, two scenarios were examined: use of alternative energy sources (solar panels) to run aerators longer than 2 hours per day at the aeration pond; and growing wetland plants at the evaporation pond. It was found that the capital cost of solar panels installation was very expensive. Enhanced use of the ponds to provide ecosystem services, including production of aquatic vegetables and fishing, could be explored further. However, possible vegetable and fish contamination should be investigated before selling such products to consumers.

KEY WORDS: MUNICIPAL WASTEWATER / EFFLUENT QUALIT / POLLUTANTS / E.COLI / ARIMA / ECOSYSTEM

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