“Research on the Pilot Project for a Decentralized Wastewater Treatment System of Yangon City”

Abstract

The existing sewerage system of Yangon City currently serves only limited areas, including Lanmadaw, Latha, Pabedan, Kyauktada, Botahtaung, and Pazundaung townships in the CBD area, along with parts of Dagon and Mingalar Taung Nyunt townships. The system was originally designed for a capacity of about 300,000 people. Prior to 2005, untreated sewage from approximately 6.5 miles of sewer lines was discharged directly into the Yangon River. However, since January 17, 2005, the first wastewater treatment plant at Tanhlyetson, Botahtaung Township, has been in operation using the activated sludge process with a daily capacity of 325 million gallons, ensuring treated effluent before discharge to the river. A second wastewater treatment plant was constructed in 2023 and began operation in 2024.

According to the Yangon City Master Plan, the city is divided into 13 zones where decentralized wastewater treatment facilities will be established. These facilities aim to treat septage collected by vacuum trucks from households across the city. In addition to centralized treatment, on-site treatment systems such as septic tanks, septic tanks with up-flow, JOHKASOU, DEWATs, and biological aeration systems are utilized, with effluent quality required to meet standards set by the line ministry and municipal authorities.

Globally, wastewater treatment technologies continue to evolve to achieve higher removal efficiencies, especially for biological oxygen demand (BOD) and nutrient removal. These components pose significant challenges and remain a critical priority due to their environmental impacts. This research focuses on evaluating a Moving Bed Biofilm Reactor (MBBR) system for nutrient and organic matter removal from municipal wastewater. The study systematically investigates the effects of polyethylene (PE) carrier filling rates, aeration rates, and different hydraulic retention times (HRT) to determine optimum operating conditions. Furthermore, the feasibility of combining the MBBR system with tertiary treatment methods, such as constructed wetlands with Canna Indica

plants and filtration media (sand, gravel, and shingle), is examined for enhanced organic and nutrient removal.

Research activities primarily focused on effluent quality monitoring and laboratory-scale investigations of these treatment processes. The ultimate aim is to support the implementation of decentralized wastewater treatment systems across Yangon City by constructing appropriate treatment plants in each zone as outlined in the Master Plan. The study also emphasizes aligning on-site wastewater treatment practices with existing design standards and guidelines. This work seeks to contribute to sustainable water supply and sanitation management in Yangon City, with particular focus on decentralized treatment approaches.