

A Study on the Overall Yield of Pingtung Wu-Lo Creek's Constructed Wetland Water Quality Purification Plan

Abstract

A downstream branch of the Kao-Ping Creek, the Wu-Lo Creek, by nature of river and creek, is regarded to fall under a state of severe pollution for how it has long been impacted by civil discharge and livestock wastewater. The Wu-Lo Creek discharge's water quality improvement research, taking into account that rivers and streams have been deprived of their self-cleansing function for how their initial environmental advantages had been sabotaged in the pollution process, and that conventional water pollution prevention and treatment methods remained an interim remedy for how they only serve to remove or reduce the level of pollution, has adopted the increasingly popular eco-engineering and constructed wetland concepts, combining the four environmental value concepts of "friendly river banks", "environmental ecology", "landscape engineering", "leisure and recreation", to instill a practical, social and educational urban river/stream environment.

The study aims to conduct subsequent monitoring on the Wu-Lo Creek drainage water quality improvement project by implementing relevant monitoring and survey on its water quality, heavy metal content in the sludge, hydrology and ecology. The Wu-Lo Creek discharge water quality improvement project is presently regarded as the largest constructed wetland in wastewater processing volume island-wide, with a maximum processing volume reaching 50,000 CMD. With its major implementation divided into two phases, Phase one takes to a natural stacked-drop filtration, which utilizes hydraulic jump to increase the oxygen concentration and undergoes filtration and contact bioprocess before the water is fed to two lotus ponds for secondary water quality purification. Phase two utilizes three Free Water Surface systems to purify the water quality in the constructed wetland, which routes water through Phase one's gravel filtration bed stacked-drop filtration, contact bioprocess and Phase two's constructed wetland to derive the natural purification yield.

Also to examine the treatment method for organically polluted creek water using the hydraulic jump method, the study has utilized a six-step stacked-drop filtration method on Wu-Lo Creek water to increase the soluble oxygen in the water by using the natural stacked-up and hydraulic jump methods, coupled with

the gravel's condensation and filtration and the contact bioprocess, to excel indirectly the microbes to biosynthesis in an oxygen rich environment, and in turn to purify the water quality. In addition, the three FWS constructed wetland units are used in water quality treatment to derive the processing yield on biological oxygen demand (BOD) and nitrogen biological oxygen demand (NBOD), and estimate a simple model in defining the range of BOD and NBOD. By focusing on water quality and volume of various units and by relying on the ecological survey and monitoring, the study aims to discern a set of optimal operating parameters, pollution removal ratio, and to establish a constant reaction ratio on Wu-Lo Creek water quality parameters in anticipation of achieving an optimal yield on the Wu-Lo Creek drainage water quality improvement project. In the meantime, it also aims to achieve ecological rehabilitation by creating a diverse environment and utilizing the porous spatial design concept, offer the general public an environment of leisure and recreation, and provide references in the constructed wetland design for treating polluted rivers and streams.