



Title: Wastewater Treatment Using Horizontal Subsurface Flow Constructed Wetland
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Source: American J. of Environmental Sciences 5(1): 99-105 , 2009

Abstract: The last few decades witnessed sharp focus on environment pollution and its impact on life in nature. Wetlands can be used for biological treatment of wastewater. Problem statement: Scarcity of water is considered as a global problem and Iran is one the countries which is facing water shortage problem. Pollution of water bodies restrict the availability of water for various uses. Treatment of waste water before disposal contributes to water conservation efforts. Constructed wetlands are techniques aim to polish water quality and reduce the harmful effect of effluent. Approach: In this study, four horizontal subsurface flow wetlands (HSSF) were constructed at the Research Station of Tehran University, located in Karaj, Iran. The study was carried out from April to September, 2007. Gravel and zeolite were used in this study as substrate. Gravel-beds with and without plants (called GP and G) and gravel-beds mixed with (10%) zeolite, with and without plants (called ZP and Z) were examined to investigate the feasibility of treating synthetic wastewater which was specifically produced and modified to imitate agricultural wastewater. Results: The results of this study indicated that the system had acceptable pollutant removal efficiency and that both plants were found to be tolerant under the tested conditions. The wetland system could achieve the NO₃-N removal of (79%) in ZP, (86%) in Z, (82%) in GP and finally (87.94%) in G. As for the P removal, the efficiencies of 93, 89, 81 and 76% were respectively achieved for ZP, GP, Z and G. The outflow concentrations of Pb and Cd were found to be under the detection limit; however, as for Zn, the removal efficiencies of 99.9, 99.76, 99.71 and 99.52% were concluded for ZP, Z, GP and G respectively. Conclusions/Recommendations: It can be concluded that constructed wetlands are efficient in removing Zn, Pb and Cd from agricultural wastewater. Plants types such as *Phragmites Australis* and *Juncus Inflexus* can contribute in treating wastewater, while Zeolite and gravel materials provide a suitable plant growth medium to replace conventional sand and gravel substrates. So it is highly recommended to use Constructed wetland for treating wastewater before disposal.