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Evaluating BMP Impacts on Surface Water Pollution: A Case Study of the Kan River, Iran

Meysam Kamali[1], Mehdi Ahmadi[2], Massoud Tajrishy[3]

1- Associate Researcher, Environmental and Water Research Center, Sharif University of Technology, Tehran, Iran

2- Assistant Professor, Civil and Environmental Engineering Department, AmirKabir University of Technology, Tehran, Iran

3-Professor, Civil Engineering Department, Sharif University of Technology, Tehran, Iran

tajrishy@sharif.edu

Abstract

Protecting surface water quality is a critical aspect of water resources management, especially in watersheds impacted by both point and nonpoint source pollution. This study assesses the effectiveness of Best Management Practices (BMPs) in reducing sediment, phosphorus, and fecal coliform loads in the Kan River watershed, Iran. The watershed was modeled using the Soil and Water Assessment Tool (SWAT), with the SUFI-2 algorithm employed for calibration and validation of streamflow, sediment, phosphorus, and fecal coliform data. Model performance was considered satisfactory based on Nash–Sutcliffe Efficiency (NSE) values for streamflow, sediment, and phosphorus simulations. Results identified soil erosion (44%) and untreated wastewater (55.5%) as the primary phosphorus sources, with peak loads occurring during spring. Among the evaluated BMPs, filter strips achieved the highest sediment reduction (27%), while terracing proved most effective for phosphorus removal. Natural wastewater treatment measures, particularly rapid infiltration systems, demonstrated the greatest potential for reducing fecal coliform concentrations. These findings emphasize the value of targeted BMP implementation for improving Kan River water quality and inform similar watershed management efforts.

Keywords: Kan River, Chitgar Lake, Nonpoint Source Pollutions, SWAT