Identification of critical sources areas under present and projected land-use for effective management of diffuse pollutants in an urbanized watershed

Al-amin Danladi Bello1\* and Mohd Ridza Mohd Haniffah1,2

1 Department of Hydraulics and Hydrology, Faculty of Civil Engineering, University Teknologi Malaysia, 81310 Skudai, Johor, Malaysia;

2 Centre for Coastal and Ocean Engineering, Research Institute for Sustainable Environment (RISE), Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia

E-mail: \* Correspondence: [ask4alamin@gmail.com](mailto:ask4alamin@gmail.com); [mridza@utm.my](mailto:mridza@utm.my)

**Abstract:** The land-use characteristics of a watershed determined the amount of pollution produced in its and can be curtailed by implementation of best management practices (BMPs) in an identified critical source area (CSA). Present and future land-use scenarios of the watershed was produced and HSPF model was used to model the hydrology and in-stream pollutants concentrations. The validated model was utilized to identify the CSA for diffuse total nitrogen (TN), total phosphorus (TP), sediment, and biochemical oxygen demand (BOD) considering the two land-use scenarios. The results showed that CSA and the water quality index produced by the two land-use scenarios varied in each of the diffuse pollutants considered. It was observed that some portion of the identified CSA remains unchanged despite the changes in the land-use and this was attributed to consistent urban development in these areas. The results in this study illustrate that BMPs can be included in the designed and planning of future urban expansion based on the identified CSA derived from the expected future land-use changes. If properly utilized, it will provide a resilience on the effects of urbanization on the diffuse pollutants loads in a rapid urbanized watershed.

**Keyword:** HSPF model, best management practice, critical source area, land-use, Skudai watershed