Uncertainty and Sensitivity Analysis of
GIS Based Continuous Hydrological Modelling

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ABSTRACT

The impact of uncertainty in spatial and a-spatial lumped model parameters for a continuous rainfall-runoff model is evaluated with respect to model prediction. The model uses a modified SCS-Curve Number approach that is loosely coupled with a geographic information system (GIS). The rainfall-runoff model uses daily average inputs and is calibrated using a daily average streamflow record for the study site. A Monte Carlo analysis is used to identify total model uncertainty while sensitivity analysis is applied using both a one-at-a–time (OAT) approach as well as through application of the extended Fourier Amplitude Sensitivity Technique (FAST). Conclusions suggest that the model is highly sensitive to uncertainties associated with the initial abstraction estimates followed by model inputs and finally the Curve Number. While the model does not indicate a high degree of sensitivity to the Curve Number at present conditions, uncertainties in Curve Number estimation can potentially be the cause of high predictive errors when future development scenarios are evaluated. The author of this research is Harry Manson. This research is presented to the department of graduate studies at Ryerson University, Toronto Ontario Canada on September 30, 2003. This work is submitted as partial fulfillment for the degree of Masters of Applied Science in Environmental Science and Management.