

Applicability of Aquacycle model to urban water cycle analysis

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ABSTRACT

The Aquacycle model was used in this study to test its applicability for an analysis of an urban water cycle. A sensitivity analysis was initially performed for the Goonja drainage basin in the metropolitan Seoul region to identify sensitive parameters. Based on the sensitivity analysis, using a condition number, which is the degree of variations in the output corresponding to variations in the parameter, the base flow index (BI) was found to be the most sensitive parameter during the wet season, followed by the effective road area, effective roof area, effective paved area and pervious storage 2 capacity. During the dry season, the base flow recession constant was the most sensitive parameter, followed by the BI. The calibration parameters were then estimated using the 2006 rainfall and discharge data. The model was verified for 2007 rainfall and discharge data using the calibrated parameters ($r = 0.97$). The calibrated parameters were found to give satisfactory performance statistics for verification of a run ($r = 0.84$). Finally, the results were compared with previous work on the same drainage basin based only on physical data and values available in the literature. The performance statistics of the calibration run, such as the SIM/REC, correlation coefficient (r), sum of the squared error and the Nash-Sutcliffe efficiency coefficient (E) were found to be better than those used in previous work, emphasizing the necessity of observed data for enhancing the performance of a conceptual model, such as the Aquacycle model.

Keywords: Aquacycle model; Sensitivity analysis; Urban water cycle

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