JPUR
JOURNAL OF PURDUE UNDERGRADUATE RESEARCH

STEM

Mitigating Runoff: Improving the Accuracy of the Long-Term Hydrologic Impact Assessment (L-THIA) Model

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Low-impact development (LID) practices are applied to mitigate runoff issues that are increased by urbanization that intensifies imperviousness of land covers. To evaluate the effectiveness of LID practices, the Long-Term Hydrologic Impact Assessment (L-THIA) Model was implemented to quantify the impact of each LID on selected land scenarios with site-specific climate information by using curve numbers (CNs). However, several versions of the model have been built over time, and inconsistencies have been introduced between the models. To improve the L-THIA model's accuracy and consistency, primary factors of the model—CNs, the interface spreadsheet, code, and equations—were checked. A summary table was built to document the CN values with specific scenarios used in the model and from other references. CN values used in the model remain unchanged while their land type descriptions were clarified. The ambiguous interface design of the model spreadsheet was improved. Relationships of the model's primary factors (rainfall and runoff, CNs and runoff) in its code were graphed. The antecedent moisture condition (AMC), which is a factor presenting the accumulated moisture in soil from previous days depending on climate information, is currently being tested for its impact in modifying CNs to better quantify scenarios. The test result will determine whether to keep AMC in the code. The accuracy and consistency of the model have been improved. Further testing and improvements are still needed.

Research advisor Bernard Engel writes: "Anqi's project provided an assessment of key parameters in the Long-Term Hydrologic Impact Assessment model developed at Purdue. This model is used globally, and interest in its application continues to grow. Her assessment provides useful information and documentation to assure the model users of its validity.

Zhang, A. (2018). Mitigating runoff: Improving the accuracy of the Long-Term Hydrologic Impact Assessment (L-THIA) Model. *Journal of Purdue Undergraduate Research, 8,* 79. https://doi.org/10.5703/1288284316746

http://dx.doi.org/https://doi.org/10.5703/1288284316746