Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2017-166-RC1, 2017


Hydrology and Earth System Sciences
Discussions
Open Access
EGU



# *Interactive comment on* "Subcatchment characterization for evaluating green infrastructure using the Storm Water Management Model" *by* Joong Gwang Lee et al.

**Anonymous Referee #1**

Received and published: 27 June 2017

The article by Lee et al tackles an interesting topic in the field of green infrastructure. The research approaches the paper investigated are meaningful for GI under smaller storm events. Some of the assumptions used in the paper need to be better explained and argued. The conclusions are not attended yet due to insufficient description of their methods, model settings, estimation of key parameters, in particular the part 2.2-2.4. Nonetheless, I think that the article had good potential for being published, provided that the following comments are adequately addressed.

General comments: 1. The research approach replies on a highly resolved spatial database of urban land cover, stormwater drainage feature and topography, what about



Printer-friendly version

Discussion paper

its potential application in a general context? Most of urban areas may not have such detailed dataset or require extensive surveying and modeling efforts. 2. Relevant references are needed to support statements in the text, see specific comments for details. The key definitions (e.g., DCIA, ICIA, SPA, BPA) are given, but a conceptual model characterizing these key processes in a watershed and their spatial connections should be provided. 3. The land cover characterization in GIS is an essential step to provide inputs for hydrological evaluation in SWMM. Very limited information is given to understand how it is done in GIS analysis. Also readers need more details on how the four types of subareas are subsequently modeled in SWMM (e.g. parameter settings), e.g., how to parameterize BPA, ICIA, SPA for subcatchments. 4. A better description of model calibration process is recommended, e.g., summary of parameters, inputs and outputs, criteria of performance.

Specific comments: 1. P1, L21-24: it is confusing to mention the dimension and details of calibration parameters in the abstract before the relevant descriptions are provided. 2. P2, L13-15: there are conflicting conclusions about the cost-effectiveness of GI, please provide references for your statements. In particular, the detention pond can be costly in terms of the construction and maintenance costs. 3. P2, L27-30: how the upstream area is discretized and the subcatchment are parameterized matter both in the modeling and calibration. Typical way to discretize subcatchments replies on GIS-based hydrological and landuse analyses to achieve reasonable characterization of natural drainage divisions. Any references to support your statements? 4. P3, L32: please define "a unit-area based analysis" 5. Figure 1: No legend for background landuse 6. P4, L15-20: A sketch of mentioned drainage system (manholes, pipes) is missing. Can author provide more information about the current drainage in the area? How many pipelines and manholes ? what is the current service level of the system? 7. Section 2.2.2: Details are needed to understand the spatial analysis used in the study. what are the inputs and resolution? What types of gis tools and processes are used to identify and digitize the 16 land covers? how do you estimate the future potential for GI implementation (e.g., to evaluate the potential of downspout disconnection for





Printer-friendly version

Discussion paper

a main building) and which parameters are used? 8. P6, L1-L10: Though Figure 3 depicts the different boundaries of BPA, I still don't understand how to set the BPA in SWMM and which parameter do you use to represent BPA? how did you choose the buffer widths in this study? Can author provide more information on how to use the "intersect" tool for estimating the BPA and SPA? 9. P7, L15-16: Authors considered DS-IA and DS_PA in subcatchments, could authors show how the two parameters are obtained? Is it a simple characterization of the dry ponds and detention areas in subcatchment? 10. P7, L16-20: How did you choose the values for Scut and IMD? Can you provide more details on the division of IA into areas with or without DS? Also you mentioned several ways to route the internal flows, how do you model it in SWMM? 11. Section 2.4.2: (a) vegetation swale (VS) seems an appropriate option to represent BPA, how the authors determined the parameters for VS, e.g., berm height, vegetation volume fraction? (b) how the authors determined the values of initial saturation and % of subcatchment imperviousness draining to the BPA from the geoprocessing steps? (c) I am confused about the way to model BPA, is it modeled as a VS (LID competent), or an individual catchment, or changes in subcatchment imperviousness and width? Why set the width (60 feet) for BPA? 12. L9, L18-19: can authors give an detailed example on the evaluation of the groundwater flow in the study region? Is it calculated using Eq. 3 (then how the authors incorporated the equation in SWMM for groundwater simulation?) or just the difference between individual subcatchment surface and its nearest stream bottom? 13. Figure 5: what is the difference between Figure 4 and 5? it seems that both figures mainly give the depiction of the subcatchments. Adding regional drainage network (manholes, pipelines) are recommended. 14. P10,L26-28: Conceptual illustrations of the 6 options are well presented in Figure 6, but I find it difficult to understand how the 6 options are modeled in SWMM in details? for example, which subcatchment parameters are used to represent the different subareas (e.g. ICIA, TIA) and how to control the flow or routing directions? 15. P11, L20-24: any reference to support your assumptions on the lengths for overland flows and surface slopes? 16. P12, L2: A brief explaining of the method is recommend. 17. P12,





Printer-friendly version

Discussion paper

L7-10: one way to represent the GI can be the decrease of DCIA, which impacts the subcatchment imperviousness directly. That is one side of the problem, another is to attenuate the surface flow and slow down the speed. Is there any measure to model this aspect in your approach? 18. P13, Eq. 5-9: how to calculate the different Q values in SWMM? which result files are used to obtain these values? 19. P14, L16-18: I don't understand, if in option 4 where rainfall onto PA is completely captured by DS or infiltrated into soil, how come the simulated flow rates are much higher than the ones from the rest options? 20. P17, L1-2: without field measurement for valuation, how do you interpret the results? Given the clay type soil, 48% is much higher than expected. 21. P17, L15: can you provide some explanations on the increasing peak flow resulting from the GI scenario?

---

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2017-166, 2017.



Printer-friendly version

Discussion paper