主　题：	2022WR032986 (Editor - Jim Hall): Decision Letter	
发件人：	wrr@agu.org	2022-9-15 16:16:09
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Dear Dr. Zhu:

Thank you for submitting "Optimizing Implementation Orders of Watershed Best Management Practices with Time-varying Effectiveness under Stepwise Investment" [Paper #2022WR032986] to Water Resources Research. I have received 3 reviews of your manuscript, which are included below and/or attached. As you can see, the reviews indicate that major revisions are needed before we can consider proceeding with your paper. I am therefore returning the paper to you so that you can make the necessary changes.

Please submit a revised manuscript that addresses the reviews and any editorial comments by November 14, 2022.

In your revision, please follow our Checklist and use our Templates for the main file and any supplements. Please provide the following:

1. A response to reviewer file that lists each major comment and describes how the manuscript has/has not been modified in response to those comments.

2. A copy of the manuscript with the changes noted (e.g., highlighted, "track changes," italics or bold changes).

3. The final revised manuscript with changes incorporated and separate final figure files (figure parts should be combined into a single file), which will be used for publication if the manuscript is accepted. If final figures are already uploaded, they can be easily copied over to the next revision version.

4. If any, supporting information text, figures, captions, and small tables in single PDF file using AGU's template. Large data tables and multimedia should be uploaded separately.

AGU requires that all data needed to understand, evaluate, and build upon the reported research must be available at the time of peer review and publication. Additionally, authors should make available software that has a significant impact on the research. Data, software, and other research objects (e.g. notebooks) should be made available in repositories that support preservation and reuse. An explicit Availability Statement in the Open Research section of the paper is required describing where readers can find and access the data (and software). Authors should include intext citations to data (and software) in the Open Research section and the full citation in the References section. Guidance on what the Availability Statement and Citation should include along with templates and examples can be found at Data & Software for Authors. .

AGU requires the corresponding author, and encourages all authors, to register for an ORCID.

Please check and verify authorship, and that all authors are included, have approved the revisions, and agreed to be listed in the order given. Authorship is final with publication. Responsibilities of the corresponding author are given here.

When you are ready to submit your revision, please login to your account (https://wrr-submit.agu.org/cgi-bin/main.plex) and click "Revise 2022WR032986."

I look forward to receiving your revised manuscript. If you have any questions, or need additional time to complete your revisions, please contact us at wrr@agu.org.

Yours sincerely,

Jim Hall
Editor
Water Resources Research

------------IMPORTANT INFORMATION-----------------------
Additional information on text preparation, formatting, acceptable file formats, supporting information, graphics preparation, and AGU style, is here.

Sharing your work is an important part of the research process, and AGU leverages and shares published research to promote the broader importance of Earth and space science. Learn how you can promote your paper, including how your paper can be considered for additional publicity or for the issue cover if it is accepted.

Associate Editor Evaluations:
Recommendation (Required): Return to author for major revisions
Accurate Key Points: Yes

Associate Editor (Remarks to Author):

In agreement with the reviewers, there is some additional framing and analysis to be done for publication. Particularly, the case study is a very small watershed that may not be representative (as reviewer 2 points out) and thus generalizable -- a second case would be ideal.

Finally, the organization and writing of the paper could use improvement as pointed out by reviewers 1 and 3.
These improvements will make the paper in a place for publication with WRR which strives to publish work that the readership can use either in methods for their own research or as evidence that a research path is worth pursuing.

Reviewer #1 Evaluations:
Recommendation (Required): Return to author for major revisions
Significant: The paper has some unclear or incomplete reasoning but will likely be a significant contribution with revision and clarification.
Supported: Yes
Referencing: Yes
Quality: The organization of the manuscript and presentation of the data and results need some improvement.
Data: Yes
Accurate Key Points: Yes

Reviewer #1 (Formal Review for Authors (shown to authors)):

Summary:

This manuscript entitled Optimizing Implementation Orders of Watershed Best Management Practices with Time-varying Effectiveness under Stepwise Investment' applies an expanded version of an existing optimization method for siting soil erosion BMPs. The paper focuses on developing modifications to the spatial optimization framework that account for (1) different implementation sequences of BMPs; (2) calculation of net present value of the BMPs; (3) time-varying effectiveness of the BMPs; and (4) watershed modeling. This study thus provides a valuable tool for estimating the effectiveness of different BMP scenarios but would benefit from expanding of the application presented (beyond erosion control BMPs), additional discussion of the results, and thorough editing. I therefore recommend this manuscript for publication in the of Water Resources Research after major revisions.

General Comments:

I am not familiar with the optimization methods used in this research, so I will not be commenting on them specifically. My comments are primarily on the general content, organization, and text.

(1) Perhaps it is my own bias, but when I read the title and the abstract, I expected this to be about urban hydrology BMPs (e.g., rain gardens, bioretention, permeable pavement, etc). (I think the editor also probably assumed this, as my field is urban hydrology and asked me to review.) I think making it more clear in the title and abstract that this is for optimization of erosion control forest management BMPs (or is there another commonly used term for these?) would prevent future readers from making the same mistake.
(2) I see no reason why these methods could not be applied to optimize spatial configuration of urban stormwater BMPs, and I think a lot of readers would be interested to see an application of this. I would encourage the authors to think about a second case study that applies the methods in a different (urban) setting - this would really strengthen the paper and widen the interested audience. However, if the authors do not want to do another case study, at least adding a section on further extensions of their proposed methods to other types of BMP optimizations (urban) would help - I would recommend covering at least these points (a) that these methods could be applied in urban settings; (b) describe what inputs would change; (c) describe what might not apply / what might need to be further modified (the hydrologic model for one would need to be greatly modified; maybe discuss how these methods could be implemented in an existing urban hydrology model like SWMM or SUSTAIN (which has a BMP optimization tool already, so how does it compare?))
(3) I found the "experimental results and discussion" section lacking. Most of the text in this section is just results, and things that someone could glean just from the plots (e.g., the entire section 4.2 is basically is regurgitation of statistics in Figure 9). Please add more discussion - what do your results mean? There are a lot of claims that are not well supported (i.e., "using the varying environmental effectiveness of BMPs was not only reasonable but could also reduce uncertainty to a certain degree." What? How did the authors get here from their results?). Please break down results more too. There is only one figure in the results section. I would recommend breaking this down into first talking about results that assume one-time investment + fixed and varying BMP effectiveness, then talking about stepwise investment + fixed and varying BMP effectiveness (or vice versa). The scenarios are hard to keep track of and this would help the reader understand the relative impact of stepwise investment. Alternatively, think of creating a 2x2 figure that has stepwise investment (yes, no) on one axis, and time varying BMP effectiveness (yes, no) on the other axis, and plotting results in matrix form.
(4) Lastly, while generally readable, the language is at times difficult to understand, with many extremely long sentences and ambiguous/ vague claims; I highlight a few below. The authors may want to seek an outside editor to help read through and identify sentences to be clarified.

Specific Section or Lined-Numbered Comments:

Line 450 - 454: This entire paragraph is a single sentence; this must be broken up into more sentences.

Line 455 - 457: "The numerical evaluation of BMP scenarios under the two objectives in this study referred to figures of scattered points with the two objectives as axes and the quantitative index measuring the overall quality of the Pareto fronts." Why is "referred to" in past tense? Is this sentence not referring to the present paper? Also, this sentence is long and confusing. Perhaps the authors mean to say "The BMP scenarios were compared by evaluating the overall quality of their respective Pareto fronts."

Line 499 - 501: "This phenomenon confirmed that uncertainties in BMP effectiveness over time may overestimate the long-term environmental efficiency of watershed management scenarios (Liu et al., 2018)." I am not following this. How do uncertainties in BMP effectiveness always result in overestimation of environmental efficiency? Can the authors claim that their results really show this? Seems like a safer conclusion is that overestimating BMP effectiveness may overestimate long-term environmental efficiency.

Line 501 - 503: Similarly, I am not following the claim that using time-varying environmental effectiveness could reduce uncertainty. There is uncertainty in any estimate of environmental effectiveness, and one could actually argue more uncertainty in a time varying estimate (which could either over or underestimate performance) than in a static estimate (which would more consistently overestimate performance). Can the authors please describe in more detail how their results constrain uncertainty?

Line 581 - 582: "The optimized multi-stage BMP scenarios were much more practical and attractive for watershed management decision-making" this is pretty subjective; I would avoid such statements - did the authors interview decision makers to determine that this was more practical and attractive? I recommend sticking to the facts, e.g., "By accounting for time-varying effectiveness and stepwise investment, the optimized BMP scenarios may better reflect reality of BMP performance and costs over time."

Reviewer #2 Evaluations:
Recommendation (Required): Return to author for minor revisions
Significant: The paper has some unclear or incomplete reasoning but will likely be a significant contribution with revision and clarification.
Supported: Yes
Referencing: Mostly yes, but some additions are necessary.
Quality: The organization of the manuscript and presentation of the data and results need some improvement.
Data: Yes
Accurate Key Points: Yes

Reviewer #2 (Formal Review for Authors (shown to authors)):

The manuscript with the title "Optimizing Implementation Orders of Watershed Best Management Practices with Time-varying Effectiveness under Stepwise Investment" by Zhu et al is very interesting. I think it is in the scope of WRR. My comments:
(1)It is true that effectiveness of BMPs is time varying, but how can we get these time varying data for each BMP?
(2)Will it be better that we implement BMPs step by step according to the time?
(3)Line 288-289, The case study area is Youwuzhen watershed, it is only approximately 5.39 km2. If a large watershed(over 1000 km2) was chosen, would the framework of this paper be still working? Do some explain.
(4)Line 331-334, the BMPs in this case were fixed, they were closing measures(CM), arbor-bush-herb mixed plantations(ABHMP), low-quality forest improvement(LQFI) and economic fruit(EF). In my opinion, they are not typical BMPs. How about if both engineering BMPs and non-engineering BMPs are adopted together?

Reviewer #3 Evaluations:
Recommendation (Required): Return to author for minor revisions
Significant: Yes, the paper is a significant contribution and worthy of prompt publication.
Supported: Yes
Referencing: Yes
Quality: The organization of the manuscript and presentation of the data and results need some improvement.
Data: Yes
Accurate Key Points: Yes

Reviewer #3 (Formal Review for Authors (shown to authors)):

The authors proposed a new optimization framework for implementation orders of BMPs with time-varying effectiveness under stepwise investment, introduced net present value to compare net costs of different BMP scenarios, and exemplified the basic idea of extending BMP optimization to spatio-temporal level. It is an interesting issue. However, there are some suggestions and questions as follows:
1. Line 24, Two blankets between "management scenario," and "which are..."? In Figure 1, please explain the meanings of sub-figures, a, b,... Line 202, Please give a example of "X(k) × 1000 + T(k)".
2. It is suggested that the sections 3.1, 3.2, 3.3, 3.4, and 3.5 are integrated to the corresponding position of Section 2 "method" because they also belong to material and methods. Section 2 is revised "Materials and methods". Please superscript of km2 in Line 288.
3. In Figure 5, please revise type or color of lines of subbasin to differentiate it from that of 10m contour. Line 312, Please denote which soil properties and land use/land cover-related parameters are derived and referenced. What instruments are used to derive soil properties? Line 315, "and precipitation" is suggested to be deleted because it belongs to meteorological data, or "meteorological data" should be revised as others.
4. The last two paragraphs in Section 3.1 should be placed to other section(s) because they are inconsistent with the content of "3.1 Study area and data". Line 384, Does V(S, t) refer to the amount of soil erosion in outlet of the watershed or a spatial unit? I think it is necessary to obtain the amount of soil erosion in each spatial unit for the optimization. If so, how do you determine it in each spatial unit? Line 391, Please give the specific initial construction cost, annual maintenance cost, and annual benefit per unit area of each BMP? Or how did you determine them?
5. Line 350, The sentence is too long. Please divide it into two or more sentences. Line 549, "Figure 9a-c demonstrates" should be "Figures 9a-c demonstrated". Line 552, "Figure 9a-c demonstrates" should be "Figures 9a-c demonstrated".
6. In Figure 9, the explanation of (a)-(c) and (d)-(f) in the title of the figure is inconsistent with the content of the figure. How did you determine the spatial units? The seven sub-figures in Figure 9 show the same distributions of BMPs with different time-varying implementation. I think different scenarios should show different BMP distributions and different time-varying implementation in a spatial unit selected from the Pareto front. The spatial units without BMPs for all scenarios are the same. What are land use types in these spatial units? These spatial units are suggested to not be encoded (=0) in a chromosome to reduce a large quantity of calculation

loads if they are same.

7. Line 574, "Figure 9c and f" should be "Figures 9c and f". Line 635, "sptio-temporal" should be "spatio-temporal". The positions of the first names and the family names are different in the references. The "-" is suggested to be deleted in the family names of the reference "Zhu, L.-J., Liu, J., Qin, C.-Z., ..." and other references.