

SDC358: Quantification of best management practice effectiveness for water quality protection at the watershed scale

Response to the Reviewers:

Reviewer: 1

Comments: The proposal has quite some amount of literature materials but not much by way of technical and methodological details. That said, the literature is not up to date: the PIs have largely ignored some newer materials, which then has an impact on the strength of the technical component. While conducting a literature review is mentioned under the timeline, some preliminary effort would have helped strengthen the proposal. Also some comments in the proposal are made without proper citation- for example "... it is difficult to ascertain the cumulative effectiveness of combinations of BMPs." This is not an original assertion.

Response: Thank you. The proposal revised to address your comment with added references and adding a thorough literature review in the objectives.

Other comments:

The challenge with representing spatial placement of BMPs (in distributed models) is easily overcome by adapting response unit definitions to watershed and/or field conditions (See for example Gitau 2003; Gitau et al., 2008 and related). BMP effectiveness factors give an indication of removal ability over time and this has value depending on the application- i.e. they can't be/shouldn't be used indiscriminately. Neither of these get at the representation of the mechanisms and maybe this is where the PIs need to concentrate their efforts.

Response: Thank you. Actually, one task being proposed is to better simulate spatial placement and effects of BMPs and land use based on new coding and re-configuration of current hydrologic response unit in the SWAT model. It is therefore a new research.

Objective 2 seems out of place given the project title. Also, there are newer IPCC reports. Authors need to focus the discussion on model applications (i.e. what they will do once the model is calibrated and validated) as opposed to model set-up, calibration and validation. Applications of/with the future climate scenarios?

Both objectives 2 and 3 also need improvement with regard to technical detail.

Response: Thank you for your comment. We have made substantial revision to objectives 2 and 3 to make our objectives clearer and more complete.

Reviewer: 2

Comment (1):

Comments: This is an important topic and a good title for a multi-state proposal to continue previous multi-state committees that focused on the models. However it is not well written. I believe that several of the problems are a result of the objectives not being well selected. For example,

- Obj 1 is similar to the overall committee title, except that it only has modeling, not monitoring, in the objective statement. However much of the “procedures” section is about monitoring and standard protocols (a great idea). Should those two perhaps be different objectives?
- Obj 2 has potential, but the procedures section does not explain what the “emerging issues” are and as a result does not add anything different than Obj 1.
- Obj 3 is OK, but not the heart of the problem that needs to be addressed.

Response: Thank you for your comment. We have made substantial revision to objectives 1 2 and 3 to make our objectives clear.

More details of my concerns are below.

The third paragraph begins a description of the limitations in current BMP modeling. This is critical to the need for the project, but it is vague (in terms of what models have the limitations) and has few references to better explain these important statements. Also these conceptual limitations are just what should be researched by this committee, and they could provide a strong foundation for the procedures. However this is not done – and I think the main reason is that the objectives do not clarify the work that needs to be done very well.

It seems to me that the committee has the potential to clarify and coordinate strategies to overcome the limitations of current BMP modeling. Or perhaps it could develop protocols to evaluate whether BMP modeling is reasonable or adequate. These would be the types of activities that would really benefit from the multi-state approach.

Response: Thank you for your comment. The paragraph was revised to address your comments.

Procedures and Activities:

Obj 1, paragraph 3. Why are activities of the USDA-ARS Southeast Watershed Research Lab mentioned specifically? This kind of detail is not given for other labs or universities and seems out of place.

Response: Removed as suggested.

Obj 2: Emerging issues listed are (1) climate change, and (2) “other water quality parameters” like sediment, nutrients, etc which really do not seem like they are emerging since they have been the core water quality issues researched by agricultural scientists for at least 40 years. The second paragraph in this section does discuss new science (climate change) but there is no apparent connection with BMPs, the focus of this proposal. Taken together, it suggests that there are no activities thought about specific to objective 2, and I suggest removing it. Perhaps it could

be replaced by a monitoring/field data collection and synthesis objective to support the modeling. Or development of methods for evaluating BMP representations in models as discussed above. Or there are various other ways the tasks could be divided.

Response: *Thank you for your comment. The objective and paragraph revised to address your comment.*

Obj 3: First sentence suggests BMPs will be developed in this project(???). I suspect it is the representation in models that will be developed. Please clarify. Statements like “it is necessary to provide information...” without any explanation of why it is necessary are not convincing. This first paragraph has some of the best sentences in the proposal, but they don’t fit here well at all. They could be in the introduction.

Response: *Thank you. Some of the verbiage were removed and put in the introduction. The objective and sentences were revised to address all the comments above.*

Minor points:

- Paragraph 1, last sentence: Separating “BMPs” and “non-BMP approaches” raises the question of what is meant by BMP approaches. I assume it is measures for dealing with non-point sources, but this is not stated. (And the Clean Water Act also uses the term BMP in the context of WWTPs -- http://en.wikipedia.org/wiki/Best_management_practice_for_water_pollution) I don’t think it needs to be, maybe just delete this sentence.

Response: The last sentence deleted.

- Paragraph 4: Since watershed and subwatershed are really not scales (they are open to being any size), instead of subwatershed scale I suggest “field scale”, which would clarify better.

Response: *Thank you for your comment. Changed to field and watershed scales.*