Hydrology and Earth System Sciences Discussions

Interactive comment on "A multi-objective optimization tool for the selection and placement of BMPs for pesticide control" *by* C. Maringanti et al.

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As one of the reviewers points out, the main topic of the paper, a methodology for the selection and placement of BMPs is highly relevant. However, the paper needs some major revisions before it can be considered for publication in HESS.

General comment:

In its present form, it is not clear what the focus of the manuscript is. It puts a lot of emphasis on the genetic algorithm (whereas in the abstract it is presented as a simple tool). Such algorithms have become standard in environmental modeling, a lengthy

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description of a particular implementation is thus, to my view, not justified, except if the paper presents some new algorithmic developments. In the particular case here, it would be far more interesting to present the algorithm in a more condensed way and to discuss in more detail the challenges of the optimization problem (why did you have to design your own algorithm, what is particular about it compared to existing algorithms, what makes it particularly suitable for the problem to solve,..). I strongly suggest putting the emphasis of the paper on the BMP tool (including SWAT) and the formulation of the optimization problem.

The applicability of the method highly depends on the reliability of the hydrological model. The calibration of the SWAT model for this case study is apparently (based on Fig. 5 and 6) far from being satisfactory. This should be discussed. And as the model calibration is a main problem in any related study, it would be very interesting to discuss at least qualitatively the impact of model prediction uncertainty on the BMP placement. A strategy to address this major problem would also add the interest of the paper.

Detailed comments:

- An optimisation algorithm should be tested on theoretical problems, in order to be confident that it is able to find the Pareto-front of the problem. If the algorithmic parameters are difficult to tune, this means that the algorithm is not suitable for the problem at hand. (and the population size should also be considered as an algorithmic parameter).

-I suggest paying more attention to the wording: the Pareto-front is a property of the optimization problem, the optimization algorithm tries to find it. Formulations as 'goodness of the front'; or 'improvement of the front' are thus misleading

-What is a dynamic linkage between an optimizer and a simulation model?

-Pesticide calibration: the text implies that the sum of differences between observed and simulated pesticide concentration was minimized. This is not a good criterion as

negative and positive differences can compensate.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 1821, 2008.

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