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Interactive comment on “Applying SWAT to predict orthophosphate loads and trophic status in four reservoirs in the upper Olifants catchment, South Africa” by J. M. Dabrowski

Anonymous Referee #1

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Overall this is an interesting and well-written paper which deserves publication. It is well structured and addresses pertinent issues within aquatic sciences. It evaluates combined hydrology and water quality model in an South African context. Moreover, it applies this model in a context relevant to the current policy debate in the country, analyzing the potential impacts of suggested policies. In so doing, it successfully links hydrology through aquatic chemistry to aquatic ecology, which is rare and innovative. Another good aspect with the analysis is that the resolution of the model results are linked to observed data quality (i.e. monthly resolution for discharge vs. annual average for ortho-phosphate), suggesting the analysis is reasonably balanced.

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In general, the methods are sound and clear, although some revisions are needed. The most important points are: (1) The paper only uses two SUFI-2 iterations to calibrate the parameters, which is probably insufficient to reach some sort of optima. I would suggest to do several more iterations (e.g. 10), to at least investigate/show whether the objective functions (NSE, PBIAS), parameters & model outputs do not change with further iterations. If they do, the analysis should be done on the final iteration set. If they don't, this analysis is needed to illustrate this point. The analysis itself can be put in an appendix/supplement. If the model work is too demanding you may consider reducing the number of simulations per iteration (e.g. 500). (2) The paper analyses the potential impact of changing management of sewage treatment plants. Hence, it would be interesting to know how well the SWAT model can simulate such changes (not just the current conditions). This is not evaluated in the paper. Perhaps the data does not allow such an analysis in the Olifants catchment, but it would be interesting with a discussion on this topic at least based on the literature. (3) Typically the model states (water and nutrients in soils, rivers and reservoirs) need several years to equilibrate after the beginning of simulations. This is normally solved by only analyzing the years after reaching this balance (removing the "warm-up" period). Did you do this? If not I would advice to do it and write/illustrate it.

Finally, I would like to see an outlook section which takes a broader scientific perspective on the issues analyzed. What did we learn as a scientific community from this work? What can be generalized to other areas and what is case specific?

See the attached PDF for detailed/technical comments.

Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/10/C7117/2014/hessd-10-C7117-2014-supplement.pdf>

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