

Interactive comment on “Hydrological impact of rainwater harvesting in the Modder river basin of central South Africa” by W. A. Welderufael et al.

Anonymous Referee #3

Received and published: 19 July 2011

Summary: The impact of runoff harvesting on catchment water resources is certainly of interest and so this paper is certainly topical. However, there are several gaps in the description of the model set up and configuration, unjustified assumptions made and limited analysis of the results which require major revision before publication.

Specific Comments: I have uploaded an annotated manuscript with comments at various places in the article that need attention. The most important of these are: “The model setup and configuration is inadequately described. How is the catchment discretized for modeling, and how were the land use and soils considered in this process. How many HRUs? Simply stating this was “done” by ARCSWAT is not adequate. Three rainfall stations are mentioned – but how are these used? Is a driver station allo-

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cated to each HRU, or was a daily surface created and applied across the HRUs? How was ET estimated across the catchment? Once the initial configuration was done, how were the major land uses in the different scenarios simulated? E.g. Be specific about the CN modifications made to account for in-field RWH and justify these. In the Agri-Con scenario, how is maize simulated. What assumptions in terms of planting date, ET controls etc were made? There are several papers that do address both the application of SWAT as well as adjustment of Curve Numbers to address agricultural practices that the authors need to address. Some of these are listed below. “The calibration is inadequate. Apart from the limited time period used, there are clear problems with the simulation results shown in Figure 5. See my comments in the annotated document that has been uploaded. Without having any more detail on the mode setup, it is difficult to interpret this, but to me there seems to be a clear problem with the way the rainfall input has been configured resulting in simulated events where there are none and vice versa. This is a well known problem in areas where convective events occur – the authors need to refer to the appropriate literature and address this. There also seems to be a lag between simulated and observed runoff. This could be the result of catchment lag not being simulated, but could also be the result of a timing problem between rainfall and runoff. For example, runoff is often measured midnight to midnight, while rainfall is often measured/accumulated at 8am each morning. “For me, the interpretation of the simulated results needs more depth of analysis – both in terms of errors that may be induced by the model setup, as well as in what the model results are telling us. Consequently, I have little confidence in the conclusions reached.

Technical corrections and other comments: There are several of these in the annotated manuscript uploaded.

Suggested Reading:

Andersson, J.C.M., Zehnder, A.J.B., Jewitt, G.P.W. and YANG, H. 2009. Water availability, demand and reliability of in situ water harvesting in smallholder rain-fed agriculture in the Thukela River Basin, South Africa. *Hydrol. Earth Syst. Sci.* 13, 2329-2347.

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Arabi M, Frankenberger JR, Engel BA, Arnold JG. 2008. Representation of agricultural conservation practices with SWAT. *Hydrological Processes* 22: 3042–3055.

Garg, K.K., Karlberg, L., Barron, J., Wani, S.P. and Rockstrom, J., 2011. Assessing impacts of agricultural water interventions in the Kothapally watershed, Southern India. *Hydrological Processes*: DOI: 10.1002/hyp.8138

Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/8/C2864/2011/hessd-8-C2864-2011-supplement.pdf>

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 5051, 2011.