

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

**W. A. Welderufael et al.**

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Comment 1: The paper is written in well and clear English. Response: Compliment accepted

Comment 2: The bibliography is almost complete and of international broad. However, more relevant references could be added (see below). Response: Relevant literatures have been added in the manuscript

Comment 3: The authors need to present well the model parameters and justify the choices and assumptions. Response: Comment accepted and revisions have been made in the manuscript

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Comment 4: P5053 L20: Rockstrom (2001): missing in the list Response: Comment accepted and revision has been made in the manuscript,

Comment 5: P5054 L10-28 You need to make more comprehensive review on SWAT model applications related specifically to water harvesting in dry environment. Response: Comment accepted and revision has been made in the manuscript,

Comment 6: P5054 L23: Replace 'suiTable' by 'suitable' in the whole paper. Response: Comment accepted and revision has been made in the manuscript,

Comment 7: P5055 L22: Conan et al. 2003b: missing in the list Response: Comment accepted and revision has been made in the manuscript,

Comment 8: P5056 / Study site Provide more details on: climatic characteristics, soil, land use, etc.. They are very important to understand the parameterization of the model. Response: Comment accepted and revisions have been made in the manuscript,

Comment 9: P5056 L17 It is recommended to be replaced by “Model parameterization” Response: Comment accepted and revisions have been made in the manuscript,

Comment 10: P5056 L18-23 Move to 2.3 Sensitivity and calibration (to be added as a separate section) Response: Comment accepted and adjustments have been made in the manuscript,

Comment 11: P5056 L21-22 Indicate the period of the observed flow data. Is it sufficient to calibrate the model by only one year (2002) data? Response: We obtained six years (2002-2006) observed daily mean flow data for the gauging station C5H056 which recorded the streamflow for the 419 km<sup>2</sup> sub-catchment inside C52A catchment. But, as we mentioned in the manuscript, we found that only the year 2002 data to be reliable for our purpose. So, we used this data to optimize or calibrate those parameters which were found most sensitive (ranked 1 to 7) to the streamflow. This has improved the prediction of the streamflow during 2002. A remarkable improvement

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was achieved graphically which is also presented in statistical test in the text when the year 2002 daily stream flow was simulated by using the calibrated values. Of course, it would have been nice to have a validation test to get more confidence on the model in predicting the real situation. Unfortunately, we were not able to do the validation test due to the unreliability in the data. Therefore, by considering the suitability of SWAT in predicting the streamflow of ungauged streams, the result that was obtained without doubt yielded at least a relative comparison among the water balances of the different land use scenarios.

Comment 12: P5057 L26-28 How did you represent the IRWH in the model? Response: By making adjustments on the CN and tillage practices. Detail explanations have been given in the manuscript

Comment 13: P5058 L5-9 Very brief. Explain more the modification and attribution of CN. Response: Detail explanations have been given in the manuscript,

Comment 14: P5058 / Sensitivity analysis Move the text (except the last phrase) to Material and method. You need here only to explain the data in Table 3. Response: Comment accepted and corrections have been made in the manuscript,

Comment 15: P5058 / Calibration Mention and justify the use of those indices in Material and methods. ‘. . . simulation procedures, default and measured parameters . . .’ Be more specific. Response: Comment accepted and detail explanations have been given in the manuscript

Comment 16: P5059 L6-12 ‘. . . to capture some of the peak flows.’ Give examples. Response: Appropriate figures have been referred to in the manuscript,

Comment 17: P5059 L15 Replace ‘Fig.5’ by ‘Fig.6.’ Response: Comment accepted and revisions have been made in the manuscript.

Comment 18: P5059 L16 The abbreviations WY, DIRC and GWQ are first time introduced need to be spelled out. Response: Comment accepted and revisions have been

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given in the manuscript,

Comment 19: P5059 /3.33 This section needs more comparison with other studies in similar environments. Response: Comments accepted and revisions have been made in the manuscript,

Comment 20: P5061 L9 Replace 'Table' by 'table' Response: Comment accepted and correction has been made in the manuscript

Comment 21: P5062 L8 It is recommended to make an analysis for different hydrological years: very dry, dry, normal, humid. Any potential impacts on downstream users? Response: The prime objective of this study was to investigate the impact of land use change on the different components of streamflow given weather condition of the study area. The impact of seasonal variability of weather on the streamflow is beyond the scope of this study objective and need to be addressed in the future research.

Comment 22: P5063 L3-7 You may provide other recommendations: model adjustments, etc. Response: It is quite obvious that evaluation of the SWAT model was not the aim of this study. We believe that this can be addressed in other subsequent studies.

Comment 23: P5064 L1 Choi et al. (2008) not found in the text. Response: Comment accepted and citation has been made in the manuscript

Comment 24: P5064 L21-33 Resort the references starting with 'M'. Response: Comment accepted and references have been sorted properly,

Comment 25: P5064 L30 Lin et al. (2007) not found in the text. Response: Comment accepted and references cited in the text

Comment 26: All tables and figures You need to spell out the abbreviations or make c.f. Response: Comment accepted and corrections have been made,

Comment 27: P5069 Table 4 You may keep only the used and interpreted indices in

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the text. Response: Comment accepted and irrelevant indices are removed,

Comment 28: P5071 Table 6 Why are using the SUM instead of the MEAN? I do recommend using only one decimal. Response: Comment accepted and corrections have been made,

Comment 29: Tables 8, 9, 10: Delete the vertical lines. Response: We couldn't find vertical lines in the tables referred to. This has been taken care of in the original submission;

Comment 30: P5077 Fig.2. Legends, names and scale are difficult to read. It seems that Rustfontein dam was not considered in the modeling. Why ? Response: Fig 2 is edited to make it clearer

Comment 31: P5078 Fig.3. Enlarge the maps. Add one or two coordinates on the X and Y axis and indicate the projection system. Response: As the maps 'as-is' are clear to the readers, we preferred to save space;

Comment 32: P5079 Fig.4. Add one or two coordinates on the X and Y axis and indicate the projection system. Add the location of climate station(s) Is the title of the figure is correct because the legends indicate that C52A is considered as a sub-catchment? Response: The figure caption is edited and the locations of climate stations are indicated in the text.

Comment 33: P5080 Fig.5. Enlarge You may use bars for the rainfall. Is it an average or a specific year? Response: Comment accepted and corrections have been made to the figure.

Comment 34: P5081 Fig.6. Enlarge. You can put them in two pages. You may use bars for the rainfall. Is it an average or specific year? Response: Comments accepted and corrections have been made. The rainfall values are average values of 1995-2007 and that has been indicated in the text.

Comment 35: For the references I would also add some relevant published works for

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case studies in North Africa and West Asia: Response: Relevant references have been included in the manuscript

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

**HESSD**

8, C3320–C3325, 2011

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