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Hydrology and Earth System Sciences Discussions

Interactive comment on "Potential climate change impacts on the water balance of regional unconfined aquifer systems in South-Western Australia" *by* R. Ali et al.

Anonymous Referee #1

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Review comments to hessd-9-6367-2012

Potential climate change impacts on the water balance of regional unconfined aquifer systems in South-Western Australia by R. Ali, D. McFarlane, S. Varma, W. Dawes, I. Emelyanova, and G. Hodgson

The authors present a study dealing with the potential changes of groundwater resources (recharge, storage, discharge, usage) under the influence of climate change in a study area in south-western Australia. They have used (or rather they based their study on) a combination of groundwater flow modeling, unsaturated zone modeling

(groundwater recharge estimation) and climate scenario development. Models were calibrated, validated (using observed data, one might assume) and run driven by scenario inputs.

To be frank, I must say that I don't think that this paper is suitable for publication in HESS (or any other international scientific journal) in its present form. I furthermore doubt that the study is publishable in such a journal even with major modifications. Among many minor issues that might be resolved (I doesn't make sense to list these in view of the major shortcomings of the paper) my major criticism is that the paper lacks almost everything that could make it interesting for a larger international scientific audience. It does not present any new methodological developments or concepts, it is based on standard tools (rather simplistic ones in parts – but still not well described and based on unclear assumptions), and it is focused on a specific regional study area with no obvious transferable and generalizable findings (beyond common sense). Thus the paper might go as a report in a journal with regional scope or a report submitted to regional authorities but for anybody outside this specific region it is not interesting.

Apart from the lack of interesting findings described in the previous paragraph, the paper does not meet the standards of a paper in an international scientific journal. It is poorly written (maybe not in terms of language; this I cannot judge completely being not a native English speaker) but in terms of organization and content. The introduction is more than 4.5 pages long, but does not explain what the purpose and scope of the study and the paper are. It lists a lot of details and facts, but most of the time it is unclear why these are mentioned and what the relation to the paper really is. It is partly repetitive. Having read the introduction the reader still not knows what to expect. For example, page 6371 largely enumerates studies done in the same field, but what for? Where does the present paper fit in? What does this paper add to the existing literature, what is new, different? What is its justification?

The description of the study area in its present form is very hard to digest and incomprehensible to people who don't know the area. Rather than trying to come up with

a verbal description of a complicated geological setting, the authors should present meaningful maps, cross sections and profiles. The section on historical groundwater use presents data without clearly stating where this comes from. Maps presented are too small and do not help much to understand the geological situation (which is 3D!).

The methods section list in a confusing and partly incomprehensible way the various tools used in the process. Again rather than attempting a description in a lengthy verbal form, a flow chart etc. would help to understand what was actually done. Many of the tools seem to be simplistic (which is not necessarily bad) without explaining the assumptions. Many concepts are not described at all (for instance: how are the discharges to rivers and the ocean calculated?, or where do the "multipliers" C-rainfall and C-evap stem from (page 6377)? The calibration of the flow model with 13!! layers where hydraulic conductivity AND specific yield / storage are calibrated (what about leakage coefficients, exchange parameters with surface waters. . ..?) is hardly described and it is to be doubted that this calibration can lead to anything meaningful.What observations were used anyway? It remains unclear what the authors did themselves and what stems from previous studies. It seems that neither the models nor the concepts and methods were developed by the authors. The section on modeling scenarios is more or less incomprehensible. It is wrapped around crude assumptions and some hints on what the data that was used might be like.

The results section is roughly 8 pages long and consists mainly of an enumeration of numbers and percentages for different areas and variables – I had to stop reading after 3 pages because none of this is interesting or helps to better understand the paper, methods or anything. This might be interesting to a local water manager but even he would probably rather like to see maps and diagrams.

The discussion section, similar to the introduction has relatively little to do with the study itself. It lists many studies of similar kind that were done elsewhere. It comes in a review style; however, many recently published review articles are missing.

Recommendations to the authors: -Compare your study (methods, concepts, results, findings) to similar studies and try to extract the aspects of your study that are new, different and interesting to scientists working in the same field. What could a potential reader (of an international (!) scientific (!) journal learn from your study? -Check whether all the methods, concepts, assumptions and data that were used to come up with the results you are presenting are sound, described in a comprehensible way and justified -Shorten your paper, leave everything that is not directly related to your study away (you are presenting a case study not a review) -Create meaningful figures that are really related to what you want to explain and use them instead of lengthy, confusing verbal descriptions -Separate your own work from previous work, make clear what the new contribution of the paper/study is, find out what it is that you want to tell people

Rating according to HESS Manuscript Evaluation Criteria

1.Does the paper address relevant scientific questions within the scope of HESS? YES 2.Does the paper present novel concepts, ideas, tools, or data? NO 3.Are substantial conclusions reached? NO 4.Are the scientific methods and assumptions valid and clearly outlined? NO 5.Are the results sufficient to support the interpretations and conclusions? NO 6.Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? NO 7.Do the authors give proper credit to related work and clearly indicate their own new/original contribution? PARTLY 8.Does the title clearly reflect the contents of the paper? PARTLY 9.Does the abstract provide a concise and complete summary? NO 10.Is the overall presentation well structured and clear? NO 11.Is the language fluent and precise? – 12.Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? n/a 13.Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? see comments above 14.Are the number and quality of references appropriate? NO 15.Is the amount and quality of supplementary material appropriate? n/a

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