

Interactive comment on “Water-use dynamics of an alien invaded riparian forest within the summer rainfall zone of South Africa” by Bruce C. Scott-Shaw and Colin S. Everson

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RC4: 'Water-Use Dynamics of an Alien Invaded Riparian Forest Within the Summer Rainfall Zone of South Africa', Anonymous Referee #3, 17 October 2018

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Anonymous referee #3 (AR3) is thanked for their thorough review. The thorough comments and suggestions provided were appreciated by the authors.

1. AR3 stated that the authors report that the hydrological campaign was conducted in conjunction with an ecological study (page 2, lines 6-7). However, the present study

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does not report on the ecological implications of the study. Are the ecological results to be reported in a separate study? Or is this the paper by Everson et al. (2016) that the authors refer to at a later stage in the manuscript? Although this study was undertaken in conjunction with an ecological study. Direct discussions with this component have been removed. Rather this paper is compared to a companion paper (hess-2016-650) that measured the water-use in a winter rainfall zone. The ecological findings are not reported on in this paper. However, more detail has been provided on the sampling strategy, density measurement and water-use up-scaling. The reference to Everson et al. (2016) has been updated in the reference list.

2. Despite the potential relevance of the species-specific water use measurements, the real added value of these data lies in their potential to indicate ecosystem benefits gained from removing or promoting the establishment of specific tree species relative to others. However, the current hydrological data set does not provide sufficient information to support such decisions. I therefore advise the authors to include data from their ecological study in the present hydrological study to interpret the hydrological differences between pristine and (heavily) invaded sites in terms of ecosystem functioning. This comment, much like comment 1, requests more emphasis on the ecological component. The authors feel that providing detail on the ecological study would make paper too broad and require the inclusion of extensive literature, methods and results. This would detract from the quantitative findings provided in this study. As such, the authors have included only the necessary ecological methods and findings required to select the monitoring site, species and assist in up-scaling. The findings show a hydrological gain and not the changes in ecosystem functioning and other services.

Specific Comments

1. Reference list appears incomplete. Checked and updated.

2. Reported wood density in table 1 is in tonne m⁻³, not kg m⁻³ The values

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were corrected to g.cm-3 which is consistent with documented studies within South Africa and abroad.

3. Please report standard deviations alongside the averages in tables 1 and 2 to provide some information on the variability of the data underlying the average. The standard deviations have been added to table 2 for each tree (calculated for the extent of the measurement period).

4. Please provide some more information on how the water use at the tree level was upscaled to the forest level. This is not described in the methods section at all. A new Chapter (2.6) has been included detailing the up-scaling process. This Chapter also links to relevant Chapters on sampling design and species selection.

5. Please analyze and discuss in more detail which plant functional traits determine the difference in water use between native and indigenous species. Although the functional traits that determine variations in water-use was not the focus of the study, it is an important component to discuss in this study. For example, "The greater sapwood area in introduced species, as well as their fast establishment, tree density and rapid growth, results in a greater transpiration rate than indigenous species per unit area." was included as a finding in this study.

6. Please indicate in Figure 1 where exactly the site is located, perhaps by adding a dot in the lower right panel. The location of the site relevant to the catchment and its elevation has been provided (yellow marker).

The study quantifies the potential hydrological benefits of the conversion of invaded stands to more pristine stands for forest management practices, in South Africa. The idea is scientifically novel and addresses key hydrological questions and the findings are likely to inform policy and decision making in the water sector. The paper needs great improvement before it can be published in HESS. Comments. Title- The title requires rephrasing I failed to understand why the authors emphasize on the "SUMMER RAINFALL ZONE OF SOUTH AFRICA". Does this have anything to do with the

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spread of invasive or water use by these plants?

Abstract-general well written but would recommend that authors include the objective of the study. As it is one has to speculate the direction of the study. Introduction- This section is very weak and too general besides reading like a technical report. I would recommend that authors strengthen the motivation and support their argument with relevant literature. Authors should intensively interrogate literature and highlight scientific research strides that have been made as well as the gaps in knowledge that still need to be addressed. So far, this is totally missing. It is therefore very difficult for one to understand whether this is a technical report or a scientific study. Methods – are poorly packaged and this makes it difficult for one to follow. I would, therefore, recommend that authors improve on this. The study area map is poorly drawn and has been illegible. A great improvement is required. Results and discussion - although these sections read well they are very shallow and lack objectivity. The discussion is weak like the introduction; there is a lack of rigorous engagement of literature. Surprisingly there are too many references in the bibliography but the manuscript content does not demonstrate a thorough interrogation of literature. Please also note the supplement to this comment: <https://www.hydrol-earth-syst-sci-discuss.net/hess-2018-227/hess-2018-227-RC2supplement.pdf>

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Please also note the supplement to this comment:

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2018-227>, 2018.