

## ***Interactive comment on “Determining regional limits and sectoral constraints for water use under climate change” by T. K. Lissner et al.***

### **Anonymous Referee #3**

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The paper describes a framework using Fuzzy Logic to identify the most critical factors that impede the ability of a region to meet its sector-specific water demands in the future under a changing climate. The paper describes two case studies: Indonesia and South Africa. The paper is generally very well-written and discusses a very timely issue. Also the use of fuzzy logic to combine the effects of multiple indicators is novel. Here are the main issues that I have with the current draft of the paper:

- The biggest concern is that some variables are allowed to change overtime (e.g., water availability), while others (e.g., water demands, etc.) are held constant to what was estimated in the literature (e.g., Vorosmarty et al 2010a,b, ICF 2013, Smakhtin 2004, Howard and Bartram 2003). Ideally all variables/indicators should be allowed to evolve temporally following the two RCP scenarios. For example, water demands  
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are likely to increase and using a range from the literature is not sufficient especially that there are numerous models that generate those following the RCP scenarios. The WaterGAP, GCAM, WBMplus, H08 are a few of those models. When the modeling capability is lacking, this needs to be stated clearly.

- There are several questions that pertain to how the authors handled water availability. For example, how is water availability defined in this study? Is it runoff or stream-flow, or something else? How does the paper distinguish between internally renewable water vs the inflows that come from upstream basins? Also the seasonality of water availability and demands are missing from the analysis, e.g., rain may occur during the non-growing season. why not compare the agricultural water demand to water availability during the growing season instead of the entire year?

- There needs to be a more elaborative explanation of the various indicators that are used in the fuzzy logic step. Simply citing a paper to get the variables is not sufficient. I would suggest to at least describe how these indicators were computed in an appendix or supplemental materials.

- I am less familiar with the Fuzzy Logic theory, but the results seem to be very much sensitive to the weights assigned to the various indicators. The paper is full of subjective assumptions of what weight factor is used (0,0.2,0.4,0.5,0.6,0.8,1.0) and it is not clear how sensitive the results are to those assumptions.

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