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Interactive comment on "Modelling multiple threats to water security in the Peruvian Amazon using the WaterWorld Policy Support System" *by* A. J. J. van Soesbergen and M. Mulligan

Anonymous Referee #1

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This paper describes the application of a new WaterWorld policy support system tool to analyze the risks to water security in the Peruvian Amazon and presents a well supported conclusion in regards to the increased impacts of mining and population growth scenarios in decreasing water quality in the basin.

The paper is very clearly structured and well outlined. The abstract and introduction are clearly written, concise and provide clear direction for the paper. The authors are also to be commended for their fluent and precise use of language. The paper was a pleasure to read.

I have 5 overall comments, some of them call for minor revisions of the paper:

1. The authors could more clearly, yet briefly, outline how this hydrological assessment for water security is new, or different from previous approaches, and why it is needed. The authors do address the obvious advantages of its use in the global South, and as a policy interface tool in regards to its user-friendliness and the data sets built into the model. However I was not clear on how much this model and the analysis it performs is different from those already in use.

2. The authors do highlight the need to include feedbacks and interactions between social and natural systems, and this may be more clearly stated as lacking in other hydrological models assessing risks to water security? (Other academic disciplines might argue it is impossible to separate these as either social or natural, but the authors here give a clear indication that they work with the interaction b/w biophysical and social processes). From my knowledge, this is not novel within hydrological science, but certainly not yet mainstream, and the paper presents convincing evidence as to why these interactions need to be included.

3. What I found lacking in the paper was a bit more on the ways in which this analysis needs to be contextualized within a series of decision making processes, and supplemented by additional data from other disciplines. I emphasize this because the model presented is highlighted for ease of use for decision makers in regards to determining correct adaptation measures. First, the authors could clearly, but again briefly, note that determining the level of water stress at the basin or sub-basin level needs to be supplemented by an analysis at the lower scale, which identifies how water security is experienced between sectors or societal groups within the basin. The paper's analysis of water security excludes the negotiation and contestation over the sum total of available water. So while the water balance might be available for total predicted demand, actual water stress by different sectors, and between social groups, will not be identified or analyzed by the model, but might well occur. The paper could acknowledge that the prediction of a non-water stressed area does not represent realities at lower scale and thus, in terms of defining/identifying adaptation strategies a lower scale resolution,

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which includes inputs of social, political, economic data sets would be needed. The authors could thus acknowledge the need to complement this high resolution model with additional analysis to determine if, and what, adaptation measures would be required even in areas identified with a low level of water stress.

4. The paper does highlight the uncertainty in terms of climate change impacts and the challenges in predicting hydrological variability. The paper also usefully highlights the (greater) role of other drivers of change in water security, and highlights uncertainty of climate change. However, the model is still presented as being able to provide decision makers with the information required to identify required adaptation measures. How would the authors advise decision makers to insert this model/analytical tool into decision making process? Perhaps the paper could highlight again in the conclusions how decision makers could cope with the uncertainty of predictions, perhaps pointing to identification of no-regrets options.

5. I have some questions about the built in scenario generator, which is identified as an advantage in using this model. Could the authors clarify if this scenario generator is able to incorporate then the impacts of autonomous adaptation - whereby changes in behaviour, land use, water use might change water demand, or water balance? This comes back to the authors' point on the need to recognize interactions and feedbacks between social and biophysical processes. At what point might the scenario generator need to be updated or complemented by additional data sets? Will local users of the model be able to identify if and when the data driving the scenarios needs to be adjusted?

specific comments: A very specific comment on the reference provided to support the papers statement on the ways in which recent urban growth is driving deforestation. Is there a more recent reference, rather than 2001 (Weinhold and Reiss), that could be used to support what is identified as a recent process? This would assist other researchers who wanted to investigate this area in greater detail.

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