Comment on hess-2021-40 - Disentangling Sources of Future Uncertainties forWater Management in Sub-Saharan River Basins by Amaranto et al.

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Referee comment on "Disentangling Sources of Future Uncertainties for Water Management in Sub-Saharan River Basins" by Alessandro Amaranto et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-40-RC1, 2021

I enjoyed reading the paper, it is well written and it addresses both a methodological (i.e., integration of UA and SA into decision-robustness frameworks) and practical (i.e., the management of Umbeluzi river basin) issues. I support the effort in integrating UA and SA into established decision-support frameworks, I do however have the following issues:

- one of these frameworks proposed in the literature (perhaps the first one), i.e., Robust-Decison Making (RDM), in fact finds robust solutions heavily relying on a technique therein called Scenario Discovery, which to me can rightfully be assumed as a SA technique (i.e., factor mapping as also pointed out by Pianosi et al. (2016) http://dx.doi.org/10.1016/j.envsoft.2016.02.008). RDM has also been extensively adopted to address water planning problems https://link.springer.com/chapter/10.1007/978-3-030-05252-2_7. My suggestion would be to integrate such literature in the intro where it is stated that only few studies dealt with this problem before.

- perhaps related with the previous point: I think the UA and SA steps should more strongly be integrated into the robustness search. Afterall, robustness broadly defines the performance of the system under uncertainty and the UA and SA steps should be *part* of it. In the proposed framework instead (Fig. 3), the search for robustness and the UA and SA steps are reported as two different steps. How can the intial robust policies be updated/ameliorated based on SA analysis results? I think one could change the current framework either bringing the UA/SA step into robustness, or establishing some sort of feedback loop between the two. This would also affect the results, where it would be great to comment upon how, in light of the GLUE and PAWN results, one could increase the robustness of the previosuly found strategies. This could perhaps come in the form of a table where e.g. a description of how the best policies for each stakeholder change going through the three steps of the frameworks, i.e., from optimal to robust to robust+SA.

minor points:

- the model description may not be immediate to a reader not used to such models. It would be good to make clear what are the policies, the uncertainties etc. etc. - a good

possible framework to follow is the XLRM (actually linked to RDM)

- better description of the GLUE method

- when introducing RID and RUD (at about line 380) it isn't immediately clear that the considered least robust alternative is not the asbolute least robust, but rather the least robust among the Pareto set (i.e., performing best for at least one stakeholder). Also, it would be ideal trying to condense the info from figures 7 to 9 into one figure - or at least plotting them together as they are "the same".

- better captions

- some remaining typos/language issues