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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Developing system robustness analysis for drought risk management: an application on a water supply reservoir" *by* M. J. P. Mens et al.

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I appreciate being invited to review the manuscript.

Overall, I believe the manuscript is a useful and interesting contribution. I am an ecologist rather than an engineer, but I often work with engineers (indeed, more often than with ecologists), and specifically around water issues. It is difficult for me to comment in a meaningful way on some technical aspects of the modeling assumptions, but I have some overview comments.

As a slight comment, the English - excellent overall - could use one or two more careful

passes. There are a few missing words or other small typos. The writing in general is clear and heuristic and suitable for an international audience.

One question I had for the authors is their reflection on why droughts are so much less well defined than floods in the literature and why there is so much less work devoted to this topic. Particularly in some fields – the private sector and the popular media come to mind – droughts seem to have most of the attention. From an ecological standpoint, droughts are much worse than floods. In a sense, I suppose I am asking the authors to prove that this topic represents a gap. I am curious, as much as anything.

Another question I had concerns an implicit assumption in the paper that climate change alters variability rather than mean aspects of climate. Much of the text seems to suggest that climate change might alter the frequency and/or severity of droughts, but not really have a big difference in long-term mean conditions. I would argue that in many areas that more water is entering (or leaving) the system.

This issue might seem academic, given that this is mostly a modeling paper, but I would argue that it has a big implication for the type of strategy that is being developed. If the overall mass balance of the system is becoming smaller, then increasing supply is not really going to be an effective solution – you can make the bathtub bigger but it won't hold any more water if you don't extra water coming out of the faucet. The Colorado and Murray-Darling basins, for instance, appear to be tracking along these lines. Demand reduction is the only effective strategy.

Moreover, you may have other elements in supply increases that could alter storage potential, such as increased evap potential with a larger surface area.

The discussion over terminology is interesting and potentially useful. I would think that a diagram that shows these concepts as alternative strategies would be very helpful. I suspect the authors have something like this available already if they have presented this information in a formal context. The illustration of these concepts seems very important since there is such much variation in how these terms are used and defined

– atlernatives such as "brittle solutions" or sensitivity analyses" may be communicating identical or very similar ideas, and simply showing these concepts visually may help clarify the authors' usage.

It would be good perhaps to also consider the "hedging" option as an operational or even governance or allocation shift. If so, then the three options become infrastructure, operations, or demand, which reflects how many decision makers would probably see these options presented.

Lastly, I know it is beyond the scope of this paper, but it would be good to allude to the overall concept of sustainability and that there is an environmental component – the environment (and especially ecosystems) also consume water, and these options did not consider these options would potentially alter environmental conditions or ecosystems, which would in reality be an important consideration.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 203, 2015.