

Interactive comment on “Water restrictions under climate change: a Rhone-Mediterranean perspective combining ‘bottom up’ and ‘top-down’ approaches” by Eric Sauquet et al.

Anonymous Referee #2

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Sauquet and colleagues applied a scenario neutral approach to evaluate the implementation of water use restrictions and their impacts on irrigated agriculture. They applied this approach to 15 catchments in the Rhone-Mediterranean region with minimal human influence. Their methods included calibration of a hydrological model to each catchment, sensitivity analyses, assessment of exposure and clustering to identify basins with common characteristics. Strengths of this work include comparison of results regionally and identification of catchment classes, as well as high quality graphics presenting the results. Areas to for improvement include problem framing, the implementation and communication of the sustainability assessment, and explanation of the clustering process and its value. With a clearer problem framing and improved

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sustainability assessment I believe the scientific and practical contributions of this work would be clearer. The topic is of interest to HESS readers, and subject to major revision I believe that it would be suitable for publication.

Comments

1. The authors make a strong case for why we care about drought risk under climate change. However, the case for why we need to simulate the implementation of water use restrictions should be stronger. The main question I would like to see the authors address here is: how does the simulation of water use restrictions give us a different picture of impacts or ways to mitigate impacts than simulating streamflow alone?

2. The authors thoroughly review the literature in the scenario neutral and decision scaling methods for assessing climate vulnerability in a bottom-up manner. However, the literature on robust decision making is complementary and should be included in this review. Specifically, there are a few robust decision making studies that assess the performance of existing water management plans [e.g. Lempert and Groves, 2010; Bloom et al., 2013]. The authors should note how their work builds upon or goes beyond these prior works.

3. The sustainability assessment is the key link between the occurrence of water use restrictions and impacts. The authors use critical thresholds as a way to measure sustainability. First, I'm not convinced that is a measure of sustainability. Is it serving as a measure of the sustainability of an agricultural economy? Or something else? Please clarify how it meets a reasonable definition of sustainability. Second, it is not clear how this critical threshold was defined. The authors state that a single critical threshold is applied to all catchments. Is this reasonable given the substantial differences in elevation (and therefore temperatures)? And is the local precipitation factored into this threshold? Lastly, do irrigators or other water users in these catchments have access to other water sources to mitigate impacts (e.g. farm ponds, groundwater)? If so, how does that influence the conclusions?

4. On lines 274 to 275 the authors state that GR6J and HYDRO correctly reproduce water use restrictions but are inconsistent with observation. Do the authors mean that the GR69 and HYDRO produce consistent results, but they are incorrect (i.e. don't match observations)?

5. On line 287 the authors state that the simulated streamflow (from GR6J) produces more accurate water use restriction simulations than the observed streamflow. This strikes me as a case where the model may be right for the wrong reasons – which casts doubt on the later results. How is this counter-intuitive result explained and what are the implications for the interpretation of the results?

6. The authors state that the CART analysis can aid sensitivity assessment at un-modelled catchments. Please address in the conclusions if and how this classification can be helpful for water managers or other scientists.

7. Lastly, there are some typographic errors and awkward phrasing in the manuscript and it would benefit from a thorough review. See a few examples below: a. Line 69 use of word “predisposition” b. Line 402 “thee” should read “three” c. Line 482 “come” should read “some” d. Line 540 use of word “incited”

References

Bloom, E., A. Draper, D. Groves, B. Joyce, M. Rayej, and D. Yates (2013), Evaluating Resource Management Strategies for Update 2013 of the California Water Plan, in World Environmental & Water Resources Congress, pp. 2391–2403.

Lempert, R. J., and D. G. Groves (2010), Identifying and evaluating robust adaptive policy responses to climate change for water management agencies in the American west, Technol. Forecast. Soc. Change, 77(6), 960–974, doi:10.1016/j.techfore.2010.04.007.

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