

The paper by Di Baldassarre et al purports to present a stylized model of hydrological extremes and human responses. This is an exciting and important research area. However, this general framing is overly broad for the analysis performed. The actual model presented illustrates interactions between drought and flood events and human operation of reservoirs. Thus, the motivation and introduction of the paper should be more closely aligned to the model presented. Also, the model and analysis feel a bit “thin”. A singular case study of “drought-then-flood” is presented for Brisbane. The authors need to show that their stylized model can capture other drought-then-flood time series, AND, importantly, that it is also able to replicate “flood-then-drought” events, as both are major motivations of the study. I suggest some major revisions that the authors may choose to undertake to make the paper more suitable for publication.

Major comments:

1. The framing is overly broad.

In many places, the authors claim to examine “human impacts”, “human interactions”, and “water management”. However, the authors solely consider dam operations. The paper should be re-written to bring the motivation more in line with the actual model presented.

2. The analysis is a bit “thin”.

- a. Fig 5 presents the main piece of analysis in the paper, which is for a drought-then-flood occurrence in Brisbane. What are the specific parameters used? How sensitive are the results to various parameter combinations? A sensitivity analysis is necessary.

- b. What about other discharge time series?

The study seek to understand if and how “human responses to drought events might exacerbate the impact of future floods, and vice versa” (Page 5, Lines 20-25). Yet the only case study presented explores one occurrence of a drought-then-flood in Brisbane.

Can the model fit other similar occurrences of drought-then-flood? Are the model parameters the same? Importantly, can the model fit occurrences of flood-then-drought? What happens to the model parameters in this temporal sequence of hydrological extremes?

3. The generic term “hydrological risk” is used, which is “broadly defined as a combination of hazard, vulnerability, and exposure”.

The natural hazard community has been trying very hard to be precise in terminology to avoid confusion and keep the external, physical driver distinct to the internal, societal vulnerability. Please be precise with terminology throughout your paper to avoid confusion.

Minor comments:

1. Throughout, terminology should be clarified to make the reader more able to understand if “reservoir inflow”, “storage”, or “reservoir outflow” are being considered. For example, “natural river flow” in Fig 1 is confusing and would be more clear as “reservoir inflow”. Generally, it should be readily apparent if flows upstream or downstream of the reservoir are being referred to.
2. Page 9, Line 14. “Actual river flows” → “reservoir outflows”
3. Caption of Fig 1. Higher flows during drought conditions? This doesn’t make sense. Please clarify.
4. Label equation variables on Fig 1. “Inflow” should be Q_N and “outflow” should be Q .
5. Page 5, Lines 20-25. Interesting! Can you expand upon your Melbourne time series and show more combinations of this?
6. Figure 2. Please label panels as A and B. For the right panel, do you show population time series of only flood-prone areas of Rome? Is population growth in flood-prone areas of Rome distinct to population growth in all of Rome? Importantly, is population growth shown here different to global urban population growth? Are you really just plotting the global urbanization trend?
7. Figure 4. Why do you plot policies per capita? Are you really just plotting the population growth rate in inverse here?
8. Figure 5. Please use different symbols for “coping with flood” and “coping with drought” lines, for those of us that do not print in color.
9. Table 1 and 2. Combine into a single table. Present tables with parameters used for all case studies presented (should be more than one case study in the revised version of the paper).
10. Conclusion outlines some data sources. The mismatch in spatial and temporal scale between physical and human data should be briefly mentioned and discussed.
11. The current goal of coupled human-natural (CNH) modeling is to capture feedbacks between human-natural systems, as well as internal feedbacks in human systems and internal feedbacks in natural systems. You should make it clear in your schematic (Fig 3) that you only focus on feedbacks between human-natural systems.